Other wildlife & fish

TEP species

Lists of TEP (threatened, endangered and proposed) species for FS and BLM lands that overlap lynx habitat were compiled – see Appendix H. Table 3-19 identifies the TEP species that may be affected by the amendment.

The website http://www.natureserve.org/explorer/ (NatureServe version 1.6) was used to evaluate whether the habitats of TEP species overlap lynx habitat. This website provides comprehensive information about almost all species, including habitat relationships.

The habitats of southwestern willow flycatcher, bald eagle and mountain plover overlap lynx habitat. These species would not be affected by the proposed amendment or alternatives because the proposed standards and guidelines don't affect their habitat. Therefore, these species are not discussed further.

Alternative A, no action

The no-action alternative includes the direction in existing plans. Alternative A would add no new management direction to conserve lynx.

Indirect effects on TEP species

There would be no change in effects on fish and wildlife resources from those of existing plans. Management area objectives, and standards and guidelines

Table 3-19. TEP species that could be affected by Northern Rockies lynx amendment

Mammals	Birds	Fish
Threatened		
Canada lynx †	Mexican spotted owl	Bull trout ‡
Grey wolf ‡		Chinook salmon
Grizzly bear ‡		Steelhead trout
Endangered		
Grey wolf ‡		Bonytail chub
Woodland caribou ‡		Colorado squawfish
		Humpback chub
		Kendall Warm Springs dace
		Razorback sucker
		Sockeye salmon
		White sturgeon

†For species in **bold**, effects may be **beneficial**.
For all other species, the overall effects may be both beneficial and detrimental.
‡ MIS (management indicator species) on some units

would remain unchanged.

Alternatives B, C, D & E

Alternative B, the Proposed Action, would add management direction for lynx about:

- Vegetation management
- Winter snowshoe hare habitat
- Lynx denning habitat
- Livestock grazing
- Winter recreation
- Minerals and energy exploration and development
- Roads and highways

Alternatives C, D and E add similar management direction with some variations. The effects of the alternatives on other TEP species are discussed below.

TEP mammals

Woodland caribou

Woodland caribou is an endangered species on the Idaho Panhandle NF in northern Idaho. Caribou are generally found above 4,500 feet elevation in mature and old growth Engelmann spruce/subalpine fir and western red cedar/western hemlock forests.

Amendment direction for vegetation management, denning habitat, livestock grazing, mineral and energy exploration and development, and roads and highways is likely to be beneficial or neutral to caribou. The proposed direction would generally reduce disturbance, or maintain current levels.

Standards VEG S5 and VEG S6 under Alternatives B, C and D, and Guideline VEG G8 under Alternative E, may have both beneficial and adverse effects on caribou. The activities these standards limit in winter snowshoe hare habitat would result in reduced disturbance. Limiting precommercial thinning could result, on a few acres, in delaying the growth of the mature forests that caribou rely on. These effects would take place only where vegetation management actions were deferred. Alternatives B and C would have similar effects; Alternatives D and E would allow some activities to take place.

Grey wolf & grizzly bear

Efforts to recover *grey wolf* populations include different approaches in different places. The wolves that naturally re-colonized in northwest Montana and in Idaho north of Interstate 90 are a fully protected endangered species, but the reintroduced wolves in the Greater Yellowstone area and central Idaho are designated as nonessential experimental populations.

Grizzly bears are a threatened species in four ecosystems – the Selkirk in northern Idaho, the Cabinet-Yaak in northwestern Montana and northern Idaho, the Northern Continental Divide in western Montana, and the Yellowstone in southwestern Montana and portions of Wyoming and Idaho.

All alternatives, to different degrees, may beneficially affect both grizzly bears and grey wolves by maintaining riparian habitat, reducing the disturbance associated with minerals and human uses, reducing habitat fragmentation and providing for animal movement.

Grey wolves may benefit from the guidance to retain foraging habitat for snowshoe hare.

Standards VEG S5 and VEG S6 could reduce the forage available for bears and big game, the wolves' primary prey, by limiting the growth of grasses, forbs and shrubs. Alternatives D and E would allow some vegetation management to occur in winter snowshoe hare habitat, so would not reduce the forage as much as Alternatives B or C.

TEP birds

Mexican spotted owl

Mexican spotted owls are a threatened species found on the Ashley NF in Utah. Dead and down timber is an important part of their habitat. Standard VEG S4 under Alternatives B and C, and Guideline VEG G7 under Alternatives D and E could result in retaining more dead and down material than existing plans.

The owls feed and nest in multistoried forests. Disturbance is important to multistoried forests – see the *Forests* section for a discussion of how disturbance changes forests. Standard VEG S6 would limit disturbance under all alternatives because it would prohibit vegetation management projects in multistoried forests. Eliminating vegetation management projects may slightly reduce the amount of feeding and nesting habitat over the long term. Alternatives D and E would allow vegetation management projects that would help maintain multistoried conditions, so they would have less effect on the owls than Alternatives B or C.

TEP fish

Ten threatened or endangered fish occur in the amendment area – see Appendix H. The alternatives propose roads guidelines that could affect fish. Guideline HU G6 could increase the sediment delivered to streams if it limits paving and Guideline HU G7 if it results in roads on side-slopes. However, guidelines can be deviated from if reasons exist. During the next five years, paving is planned for only two miles of road, and road construction on ridge-tops is planned for only seven miles. Therefore, the effect of these guidelines is negligible.

The alternatives propose management direction for livestock grazing similar to the PACFISH and INFISH direction amended into the existing plans of most units west of the Continental Divide. For units east of the Continental Divide whose plans do not contain similar direction, adding this grazing direction may beneficially affect fish by managing riparian-area grazing to achieve conditions similar to historic.

Sensitive species

For the FS, a *sensitive species* is one designated by the Regional Forester because of concern about the viability of its population as evidenced by significant current or predicted downward trends:

- In population numbers or density
- In habitat capability that may reduce an existing species' distribution

For the BLM, a *special status species* is one designated by the State Director and the director of the state's fish & wildlife agency when a native species population:

- Is small and widely dispersed
- Is in immediate danger of extinction or extirpation, or its distribution is in danger of becoming significantly reduced; or
- Lives in ecologically unique places

Although neither of these designations is covered under ESA, management direction is provided by FS policy in FS Manual 2670 and BLM policy in BLM Manual 6840.

Lists of sensitive species for FS and species of special concern for BLM lands were compiled where they overlap lynx habitat

Table 3-20. Sensitive species that could be affected by the proposed lynx amendment

Mammals	Birds	Fish	Amphibians
Dwarf shrew †	Boreal owl ‡	Artic grayling ‡	**Boreal toad**
Fisher ‡	Great grey owl ‡	Colorado River cutthroat trout ‡	**Northern leopard frog**
Marten ‡	Merlin	Interior redband trout	
Wolverine ‡	Northern goshawk ‡	Ling	
	Olive-sided flycatcher	Sicklefin chub	
	Swainson's thrush	Snake River cutthroat trout ‡	
	Black-backed woodpecker ‡	Sturgeon chub	
	Red-naped sapsucker	Torrent sculpin	
	Three-toed woodpecker ‡	West slope cutthroat trout ‡	
	Williamson's sapsucker ‡	Yellowstone cutthroat trout	
	White-headed woodpecker		
	Golden-crowned kinglet		
	Hammond's flycatcher		

†For species in **bold**, effects may be **beneficial**; for species in *italics,* effects may be *detrimental*. For all other species, the overall effects may be both beneficial and detrimental.
‡ MIS species on some units

Table 3-21. Sensitive species not affected, but with habitat in the amendment area

Mammals	Birds	Amphibians & reptiles	Invertebrates
Bighorn sheep ‡	Peregrine falcon ‡	Coeur d'Alene salamander	Regal frittilary
Northern bog lemming ‡	Baird's sparrow	Spotted frog ‡	Tawny crescent butterfly
Spotted bat	Common loon ‡	Wood frog	
Townsend's big-eared bat	Flammulated owl ‡		
Water vole	Fox sparrow		
	Golden eagle ‡		
	Harlequin duck ‡		
	Loggerhead shrike		
	Mountain plover		
	Mountain quail		
	Pygmy nuthatch ‡		
	Trumpeter swan		

‡ MIS species on some units

– see Appendix H. Table 3-20 lists the sensitive species that may be affected by the proposed amendment; the effects are discussed below. Other species are not affected by the amendment because their habitat would not be affected, so they are not discussed further – see Table 3-21.

Alternative A, no action

Alternative A, the no-action alternative, would add nothing to existing plans.

Indirect effects on sensitive species

Alternative A would not change the effects on fish and wildlife from those of the existing plans.

Alternatives B, C, D & E

Sensitive mammals

Fisher, martin & wolverine

Wolverines may benefit from Standard HU S1 that limits over-the-snow use in new areas and from Standard HU S3 and Guidelines HU G3 and HU G9 that result in reducing disturbance. Wolverines may also benefit from Standard VEG S4 that retains dead and down material. Standards VEG S5 and VEG S6 under Alternatives B, C and D, and Guideline VEG G8 under Alternative E, would maintain dense stands for the prey species *martens, fishers* and wolverines rely on. Deferring vegetation management activities in winter snowshoe hare habitat would reduce the amount of human disturbance in some areas, which may also benefit wolverines.

However, deferring activities until winter snowshoe hare habitat is no longer provided could delay the development of mature stands, affecting when mature stands would be available. Even so, fire, and insects and disease would continue to suppress or kill some trees, releasing the growth of others to mature into large trees – see the *Forests* section later in Chapter 3.

Alternatives B and C would have similar effects. Alternative D would allow vegetation management under certain conditions that could result in more stands growing into mature, large trees.

Under Alternative E, fuel treatments would be allowed under Standard VEG S5, and Standard VEG S6 is dropped and replaced by Guideline VEG G8. Prey species that rely on dense stands may not be as abundant if fuel treatments reduce habitat density. It's likely that not all winter snowshoe hare habitat would be treated. Based on the projected annual fuels program, about five percent of winter snowshoe hare habitat may be reduced under Alternative E.

Dwarf shrew

Dwarf shrew use dead and down trees and logs for feeding and nesting. Standard VEG S4 under Alternatives B and C, and Guideline VEG G7 under Alternatives D and E, would result in retaining more dead and down timber than the existing plans. Therefore, the action alternatives may benefit shrews.

Sensitive birds

Sensitive bird species would be affected mostly by vegetation management direction about retaining dead and down trees and the activities allowed in winter snowshoe hare habitat.

Black-backed woodpeckers, red-naped sapsuckers, three-toed woodpeckers, Williamson's sapsuckers and *white-headed woodpeckers* all feed on the insects and nest in the cavities found in dead and dying trees. Standard VEG S4 under Alternatives B and C, and Guideline VEG G7 under Alternatives D and E, would result in retaining more dead and down timber than the existing plans. Any increase in disease or tree mortality would be good for woodpeckers and sapsuckers. Therefore, the action alternatives may benefit them.

Habitat may be reduced for *golden-crowned kinglets* and *Hammond's flycatchers*. These species use older mature forests. Management direction that results in delaying the growth of mature stands, such as Standard VEG S5 may affect these species. However, it's unlikely maturity would be delayed everywhere vegetation management was deferred, because fire, and insects and diseases still would still take place.

Standards VEG S4 and VEG S5 could either retain or decrease habitat for *boreal owls, great grey owls, merlins, northern goshawks* and *olive-sided flycatchers*. These birds use dead and down trees as nesting sites, and the trees provide habitat for the small mammals on which they prey.

Standard VEG S4 or Guideline VEG G7 would retain more dead and down habitat than existing plans. Standard VEG S4 could decrease the amount of older forested habitat due to increased mortality from insects and disease. However, it's likely the decrease would be minimal since the standard applies only to areas smaller than five acres that have been disturbed by fire or insect and disease.

Standard VEG S5 would retain the dense regenerating stands that provide habitat for prey species and could delay the development of mature forests. This may affect birds that use these stand conditions.

Swainson's thrush may be affected by the direction in Standard VEG S6 that would prohibit vegetation management projects

in multistoried stands. Multistoried stands need disturbance to remain multistoried. Limiting all vegetation management may reduce the amount of feeding and nesting habitat available over the long term. This species also may benefit from maintaining a dense understory. Alternatives B, D and E would allow vegetation management projects to help maintain multistoried conditions; therefore, they would have less effect than Alternative C.

Under Alternative E, Standard VEG S6 is dropped and replaced by Guideline VEG G8. This would allow more activities to take place that may result more open, forested areas. This could reduce habitat quality for Swainson's thrush on treated acres.

Sensitive amphibians

Boreal toad and *northern leopard frog* may be affected by road Guidelines HU G6 and HU G7. These guidelines could limit paving and would recommend building roads on side slopes, which may result in increased sediment delivered to streams. However, little paving or road construction is planned in the amendment area, so the effect likely would be negligible.

Grazing standards may beneficially affect amphibians by managing livestock grazing in riparian areas.

Sensitive fish

Ten sensitive fish species occur in the amendment area. The effects on sensitive fish are the same as those described for TEP fish.

MIS species

Table 3-22. MIS species that could be affected by the proposed lynx amendment

Mammals	Birds	Fish	Invertebrates
Beaver †	**Blue grouse**	Bonneville cutthroat trout	Macro invertebrates
Black bear	**Downy woodpecker**	Brook trout	
Bobcat	**Hairy woodpecker**	Cutthroat trout	
Elk	**Mountain bluebird**	Large mouth bass	
Moose	**Northern flicker**	Rainbow trout	
Mule deer	Pileated woodpecker	Sculpin	
Red squirrel	**Red-breasted nuthatch**	Trout	
White-tailed deer	**Ruby-crowned kinglet**		
	Three-toed woodpecker		
	Willow flycatcher		
	Yellow bellied sapsucker		
	Yellow warbler		

†For species in **bold**, effects may be **beneficial**.
For all other species, the overall effects may be both beneficial and detrimental.

MIS (management indicator species) are managed under the authority of NFMA. There is no similar requirement for the BLM. MIS are listed in existing plans; Appendix I identifies MIS that overlap lynx habitat.

Several MIS species are also TEP or sensitive species, as noted with a "‡" in Tables 3-19, 3-20 and 3-21. Those species have been discussed previously and will not be discussed further.

Table 3-22 lists the MIS species that may be affected by the proposed amendment; the effects are discussed below. Other species are not affected by the amendment because their habitat would not be affected, so they are not discussed further – see Table 3-23.

Table 3-23. MIS (not TEP or sensitive) <u>not</u> affected, but with habitat in amendment area

Mammals	Birds	
Montane vole	Belted kingfisher	Ruffed grouse
Mountain goat	Brewer's sparrow	Rufus-sided towhee
Mountain lion	Lark sparrow	Sage grouse
Water shrew	Lincoln's sparrow	Vesper sparrow
Western jumping mouse	Northern oriole	Warbling vireo
	Ovenbird	White-crowned sparrow
	Prairie falcon	White-tailed ptarmigan

Alternative A, no action

Alternative A, the no-action alternative, would add no new management direction for lynx to existing plans.

Indirect effects on MIS species

Alternative A would not change the effects on fish and wildlife from those described in the existing plans.

Alternatives B, C, D & E

MIS mammals

Black bear

Some standards may beneficially affect *black bears* by retaining winter snowshoe hare habitat, which may provide for prey, retain denning habitat, maintain riparian habitat, reduce the disturbance associated with minerals, reduce habitat fragmentation and help provide for animal movement.

Standards VEG S5 and VEG S6 under Alternatives B, C and D, and Guideline VEG G8 under Alternative E, could reduce the forage available to bears by limiting the growth of grasses, forbs and shrubs. Alternatives D and E would allow some vegetation management to occur in winter snowshoe hare habitat; therefore, they would not reduce bear forage as much as Alternatives B or C.

Elk, mule deer, white-tailed deer & moose

Some standards may beneficially affect big game by retaining winter snowshoe hare habitat, which may provide hiding cover, maintain riparian habitat, reduce the disturbance associated with minerals, reduce habitat fragmentation and help provide for animal movement.

Standards VEG S5 and VEG S6 under Alternatives B, C and D, and Guideline VEG G8 under Alternative E, could reduce the forage available for *elk, mule deer* and *white-tailed deer* by limiting the growth of grasses, forbs and shrubs; however, these standards maintain hiding cover. Alternatives D and E would allow some vegetation management to occur in winter snowshoe hare habitat, and therefore would not reduce forage as much as Alternatives B or C.

Bobcat

All alternatives may beneficially affect *bobcats* by retaining winter snowshoe hare habitat, maintaining riparian habitat, reducing habitat fragmentation and providing for animal movement.

Beaver

All alternatives may beneficially affect *beaver* by maintaining riparian habitat.

Red squirrel

Red squirrels are an alternate prey for lynx. All alternatives may beneficially affect red squirrels.

Standard VEG S3 could result in retaining mature forests, red squirrel habitat.

Standard VEG S4 in Alternatives B and C, and Guideline VEG G7 in Alternatives D and E, would add management direction to retain the dead and down trees found in small patches.

Standards VEG S5 and VEG S6 could delay the development of mature trees or result in more insect and disease outbreaks, which could reduce squirrel habitat if no other disturbance occurred.

Guideline VEG G5 says habitat for red squirrels should be provided in each LAU. Although guidelines are not mandatory, if

this requirement were added to existing plans, it should benefit squirrels.

MIS birds

Blue grouse, yellow warbler and *willow flycatcher* habitat is associated with riparian areas and willows. Grazing Standards GRAZ S1, GRAZ S2 and GRAZ S3 would retain willow, aspen and riparian habitat, providing additional protection for these birds.

Mountain bluebirds, hairy woodpeckers, downy woodpeckers, northern flickers, red-breasted nuthatches, ruby crowned kinglets, three-toed woodpeckers and *yellow-bellied sapsuckers* all feed on the insects and nest in the cavities found in dead and dying trees. Standard VEG S3 could result in retaining habitat beneficial to these species. Standard VEG S4 in Alternatives B and C, and Guideline VEG G7 in Alternatives D and E, would add management direction to retain small patches of dead and down trees.

The *pileated woodpecker* is another species that may benefit from this direction. Pileated woodpeckers also use older forests. Standard VEG S4 or Guideline VEG G7 could result in a reduction of older forests if increased mortality from insects and disease occurred, but it's unlikely there would be large losses because the direction applies only to patches of dead trees smaller than five acres.

MIS fish & macro invertebrates

Fifteen MIS fish species occur in the amendment area; one NF has identified macro invertebrates as an MIS group. The effects for MIS fish and macro invertebrates are the same as those described for TEP and sensitive fish.

Cumulative effects

Alternative A

Management direction incorporated through the INFISH and PACFISH amendments, the OHV amendment, the Healthy Forest Rangeland Initiative and the Roadless Policy provides improved habitat conditions for wildlife and fish by providing secure areas and protecting special habitats, even without the added protections that would be afforded by the lynx amendment.

Cumulatively, the past, present and reasonably foreseeable actions described in Appendix L, would generally improve habitat conditions.

Alternatives B, D, D & E

The action alternatives would incorporate management direction to improve habitat conditions for most species by maintaining riparian habitat, reducing the disturbance associated with minerals and human uses, reducing habitat fragmentation and providing for animal movement.

Cumulatively, the past, present and reasonably foreseeable actions described in Appendix L, in addition to the lynx amendment, would improve habitat conditions.

Fire

Affected environment

Natural disturbances such as fire, wind, and insects and diseases, help shape forests. In the northern Rockies, periodic fire is the dominant disturbance process that changes forests.

While fire is widespread, it's seldom uniform. Every forest has its own characteristic pattern of fire intensity, frequency and size. *Fire regime* and *condition class* are used to characterize fire.

Fire regime

The fire regime describes the historic pattern of fire: how often (frequency); how hot (intensity); and how big (scale). Ecologists often describe three fire regimes for Western forests – *understory, mixed severity* and *stand replacing* (Agee 1993; Arno 2002; Brown & Smith 2000; Fischer & Bradley 1987; Hessburg & Agee in press; Jones & Barrett in press; Keane et al. 2002; Smith & Fisher 1997).

- *Understory* – Understory fires burn frequently, from once a year, to about once every 35 years, as *low-intensity* surface fires that consume forest litter and kill small trees in small patches. Understory fires generally do not kill large, fire-resistant trees or substantially change the structure of *the forest.*
- *Mixed severity* – Mixed-severity fires burn about every 35 to 100 years, as a *mixture* of *understory* and *stand-replacing* fires, or as *intermediate-intensity* fires that kill fire-susceptible trees while the fire-tolerant trees survive. Mixed-severity fires produce a diverse forest in terms of both structure and species composition. The fires are medium sized.
- *Stand replacing* – Stand-replacing fires are infrequent, burning about every 100 to 200 years. Stand-replacing fires are large and *high-intensity,* killing most trees. They make way for a new forest.

Historically, fires at lower elevations tended to be understory and fires at higher elevations stand-replacing, although substantial variability has always existed.

Condition class

Condition class describes the departure from historic conditions based on the number of missed fire cycles and the amount of change in forest structure and species composition (Schmidt et al. 2002).

- *Condition Class 1* – Fires have burned as often as they did historically; the risk of losing key ecosystem components is low. Vegetation composition and structure is intact and functioning.
- *Condition Class 2* – Fires have not burned as often as they did historically, missing one or more cycles. The risk of losing ecosystem components is moderate, with moderate changes in fire size, intensity, landscape patterns or vegetation.

- *Condition Class 3* – Fires have significantly departed from their historic frequency by missing multiple cycles. The risk of losing ecosystem components is high, with dramatic changes to fire size, intensity, landscape patterns or vegetation.

Lynx habitat occurs in three kinds of forests in the amendment area:

- *Mixed conifer*, which includes Douglas fir, western larch, grand fir and western red cedar
- *Spruce/fir*, which includes Engelmann spruce, subalpine fir, alpine larch, hemlock and whitebark pine
- *Lodgepole pine*

Table 3-24 describes the fire regimes and condition classes of the three kinds of forests that constitute lynx habitat in Montana.

In mid-elevation *mixed conifer forests,* fires range from understory to stand replacing.

Fire suppression has limited how often fires burn. Some places have missed one or more fire cycles and fall into Condition Classes 2 or 3. Others are closer to historic conditions, in Condition Class 1.

Today, mixed conifer forests are generally denser and contain fewer fire tolerant species like western larch and ponderosa pine than when low- to intermediate-intensity fires kept parts of the forest thinned out (Quigley et al. 1996). Forest conditions today contribute to greater numbers of large high intensity fires.

In high-elevation *spruce/fir* and *lodgepole pine forests,* infrequent, severe fires are the norm. Because fires burn only about every 100 to 200 years in these cold, moist, high-elevation forests, fire suppression has had less of an effect than in other fire regimes. These naturally dense forests are close to historic conditions, generally in Condition Class I.

Excluding fire has also reduced the role played by low- and intermediate-intensity fires. At higher elevations, such fires kill competing fir and spruce trees so whitebark pine can grow and some lodgepole pine can develop old growth characteristics.

Fire suppression has changed the natural age distribution of forests at the landscape level. Stand-replacing fires used to create a mosaic of even-aged forests across the landscape. Today there are proportionately fewer young even-aged forests and more, older forests (Hessburg et al. 1999; Hillis et al. 2003; Losensky 2002). Excluding fire has resulted in a more homogenous landscape with an

Table 3-24. Lynx habitat by forest type, fire regime & condition class in Montana

Forest type	Fire regime	Condition class	Estimated % lynx habitat
Mixed conifer	Mostly mixed severity	1, 2 or 3	26%
Spruce/fir	Mostly stand replacing with some mixed severity	1	40%
Lodgepole pine	Mostly stand replacing with some mixed severity	1	34%

increased potential for larger stand-replacing fires.

In dry, warm low-elevation forests, frequent low-intensity fires are the norm, maintaining stands of large, widely spaced trees. Fire suppression has resulted in making many of these forests unnaturally dense, and the species composition has shifted away from ponderosa pine to Douglas fir.

These forests are where the greatest detrimental effects of excluding fire can be seen. These forests are in Condition Classes 2 and 3 (Arno 2002); these forests are not lynx habitat.

Policy

After 1910, when wildfires burned three million acres and killed 85 people in northern Idaho and western Montana, the Forest Service began to direct serious efforts toward suppressing wildfires. Severe fires occurred again in 1919, 1924, 1925 and 1934. In 1935, the agency adopted the "10 am policy," which said all fires were to be controlled by 10 am the day following their discovery. The policy was repealed in 1973 as the agency shifted from simply controlling fire to managing it and using it as a tool on federal lands.

Fire suppression for the last 80 years, along with grazing and logging, has changed the way fires burn and changed the age, species and structure of some forests (Quigley et al. 1996). Further, as people have built more homes in the woods, the ability to allow fire has decreased even as the fire risk has increased.

The results of excluding fire became increasingly apparent during the last decade of the 20th century. The federal government re-examined wildland fire policies. In 1995, the *Federal Wildland Fire Management Policy* was written to recognize the essential and inevitable role of fire, and the need to return, not eliminate, fire from forests.

Other recent documents set goals for wildland fire policy:

- *Managing the Impact of Wildfires on Communities & the Environment - the National Fire Plan* (USDA FS & USDI 2000)
- *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment – 10-Year Comprehensive Strategy* (USDA FS 2001)

They set goals to:

- Improve fire prevention and suppression
- Promote community assistance
- Restore fire-adapted ecosystems (rehabilitate the land after fire)
- Reduce hazardous fuels

This amendment addresses only the last goal – during scoping, wildland fire risk was identified as one of the primary issues.

Another recent document, *The Development of a Collaborative Fuel Treatment Program* (USDA FS et al. 2003), describes criteria for selecting fuel treatment projects. The multi-party MOU (memorandum of understanding) defines high-priority areas as the WUI (wildland urban interface) and Condition Classes 2 and 3 outside the WUI.

Fuels program
Congress annually sets goals, program size and emphasis through its appropriations. Table 3-25 summarizes the annual FS fuels program projected for Montana based on these priorities. Almost half of the amendment area's lynx habitat is in Montana, providing a basis to characterize the fuels program for the amendment area.

In Montana, about 70 percent of the fuel treatments would occur inside the WUI (Lasko, pers. com.). Inside the WUI, fuel treatments most likely would be within a mile of structures and designed to reduce the intensity and spread of fire to communities. Many treatments would occur in the dry, low- to mid-elevation forests that have missed one or more fire cycles and are in Condition Classes 2 and 3.

At current funding levels, about 38,000 acres or one percent of the WUI would be treated annually.

The other 30 percent would occur outside the WUI.
Outside the WUI, fuel treatments most likely would be designed to restore or maintain a semblance of the forest structure historically produced by fire. Generally, restoration would occur on lands in Condition Classes 2 or 3, and maintenance in Condition Class 1 lands.

Annually about 16,000 acres would be restored or maintained by using prescribed fires and removing vegetation, generally in areas that have missed one or more fire cycles. Vegetation may be removed to reduce fire intensity before burning or as the sole method of treatment.

Each year where wildland fire use is allowed, some acres would be restored or maintained by lightning fires. In Montana, wildland fire use is allowed on about three million acres, which includes most wilderness areas and some non-wilderness land.

At current funding levels, less than one percent of the area outside the WUI could be treated annually.

Conditions in Montana

FIA data for Montana was used to find how often fuel treatments might take place inside winter snowshoe hare habitat where amendment restrictions may apply. Three key assumptions were used in this analysis:

- Fuel treatments would occur evenly across the landscape, regardless of condition class
- The WUI was defined as the zone within a mile of where people live, liberally measured as just one structure per ten square miles, and
- Winter snowshoe hare habitat is composed of both high- and low-

Table 3-25. Projected *annual* fuels program in Montana

	Inside WUI	Outside WUI	Total acres
Fuels program	38,000 acres	16,000 acres	54,000 acres
Forested, not wilderness	3,578,000 acres	8,335,000 acres	11,913,000 acres

Table 3-26. Lynx habitat in Montana

	Lynx habitat	High-density	Low-density	NF lands
Inside WUI	1,685,000 acres	382,000 acres	307,000 acres	3,578,000 acres
Outside WUI	5,519,000 acres	1,460,000 acres	1,065,000 acres	8,335,000 acres
Wilderness	1,856,000 acres	511,000 acres	395,000 acres	2,653,000 acres
Non-forested	0	0	0	2,888,000 acres
Total	9,060,000 acres	2,353,000 acres	1,767,000 acres	17,454,000 acres

density forests – see the *Lynx* section.

Table 3-26 shows how much winter snowshoe hare habitat is estimated to be inside and outside the WUI.

Conditions in Montana can be summarized as follows:

1) About 52 percent[1] of the NF acres in Montana are lynx habitat
2) About 47 percent[2] of the WUI is lynx habitat
3) About 11 percent[3] of the WUI is high-density forests
4) About nine percent[4] of the WUI is low-density forests
5) About 1.7 million acres, or about ten percent[5] of the NF acres in Montana, are lynx habitat inside the WUI

[1] 9,060,000 / 17,454,000 = 52%

[2] 1,685,000 / 3,578,000 = 47%

[3] 382,000 / 3,578,000 = 11%

[4] 307,000 / 3,578,000 = 9%

[5] 1,685,000 / 17,454,000 = 10%

Effects

Three factors influence fire behavior – weather, topography and vegetation. Land managers can modify only vegetation.

The vegetation characteristics that influence fire behavior are the species composition, and the amount and arrangement of the vegetation.

Fuel treatments change fire behavior by changing the arrangement or reducing the amount of vegetation, which reduces how hot fires can burn. Fuel treatments are designed to reduce the spread and intensity of surface fire, and the initiation and spread of crown fire. Fuels can be reduced by burning or by physically removing vegetation.

Many fuel treatments designed to reduce the fire risk to communities occur within a mile of structures. Others may take place several miles away, when topography, wind patterns and fuels combine to create the potential for fire to spread to a community.

For structures to be protected, landowners must clear the fuels 100 to 200 feet away from structures and build or change their structures to be fire-resistant (Cohen, 2000 a & b).

While fuel treatments don't prevent fires, they do increase the likelihood that structures will be left standing after fire. Even when the fuels have been treated, fires may still threaten communities and be outside the control of firefighters during extreme weather conditions.

Since fire is a natural and necessary forest disturbance process, the goal of some fuel treatments is to restore and maintain the presence of fire. The health of some forests is declining because fire has been excluded. Treatments are designed to resemble historic fire, or to reduce vegetation so when fire does occur, it will behave more like it does under historic conditions.

Restoration and maintenance are not directly associated with protecting homes in the WUI. However, depending on their location, such treatments may contribute to reducing the threat of crown fires to communities (Finney 2001).

Table 3-27. Projected fuels program in Montana after a decade

	Fuel treatment program	High-density lynx habitat	Low-density lynx habitat
Inside WUI	380,000 acres	38,000 acres	35,000 acres
Outside WUI	160,000 acres	27,000 acres	20,000 acres
Total	540,000 acres	65,000 acres	55,000 acres

The acres of fuel treatment projected inside the WUI may be high because WUI was so liberally defined for this analysis and because site-specific conditions may show some areas are not a treatment priority.

Alternative A, no action

Under the no-action alternative, agencies would implement the *National Fire Plan* and the *10-Year Comprehensive Strategy* within the direction set by existing plans and fire plans.

In Montana, about 540,000 acres of fuel treatment are projected for the next decade – see Table 3-27. About 380,000 acres are inside the WUI. Of these, 73,000 acres may be both inside the WUI and in high- or low-density forests. The no-action alternative would allow fuel treatments inside lynx habitat.

Alternatives B, C & D

Under the action alternatives, agencies would add management direction that would apply to fuel treatments in lynx habitat. The management direction for these alternatives does not affect fire suppression – that's an emergency – or wildland fire use, which replicates the natural role of fire and typically occurs in wilderness areas. See Table 2-1 in Chapter 2.

Objectives VEG O1 & VEG O3

- Objective VEG O1 says to manage vegetation similar to historic patterns while maintaining the habitat components that help conserve lynx.
- Objective VEG O3 says to use fire to restore ecological processes and maintain or improve lynx habitat.

Both objectives are compatible with the *National Fire Plan* and the *10-Year Comprehensive Strategy*. The objectives support mechanically removing vegetation and using fire to maintain and restore wildlands consistent with historic disturbance patterns.

Standard VEG S1

Standard VEG S1 says vegetation management projects may not result in more than 30 percent unsuitable habitat, unless a broad-scale assessment substantiates higher historic levels. Most fuel treatments could be designed to retain enough trees to meet the terms of Standard VEG S1.

Alternative B

Under Alternative B, Standard VEG S1 would apply the 30 percent limit to a single LAU.

In Region 1, less than 13 percent of the LAUs currently exceed 30 percent unsuitable, mostly due to large wildfires (Hillis et al. 2003). The impact of the 30 percent standard limiting fuel treatments would be small because most LAUs are well within the standard. LAUs that don't meet the standard are less likely to need treatment to reduce fuels.

Alternative C

Under Alternative C, Standard VEG S1 would apply the 30 percent limit to a single LAU or a fixed combination of adjacent LAUs, but would not limit prescribed fires. Outside winter snowshoe hare habitat, vegetation could be removed to treat fuels before burning was done.

Mechanical fuel treatments may be prohibited in a few areas where large fires have burned, such as the 1988 Yellowstone fires (Hillis et al. 2003). The effects would be less than those under Alternative B.

Alternative D
Under Alternative D, Standard VEG S1 would apply the 30 percent limit to a sub-basin or isolated mountain range.

Prescribed fires and mechanical fuel treatments would be prohibited only in a very few areas that have had large landscape fires (Hillis et al. 2003). The effects would be less than those under Alternative C.

Alternative E
Under Alternative E, Standard VEG S1 would not apply to fuel treatments developed through a collaborative process; therefore, it would not constrain them.

Standard VEG S2
Standard VEG S2 says timber projects may not result in more than 15 percent unsuitable habitat in an LAU in a ten-year period.

Most fuel treatments could be designed to retain enough trees to meet the terms of Standard VEG S2, but sometimes they might remove more vegetation and create unsuitable habitat.

Currently about 13 percent of the LAUs in Region 1 have more than 15 percent unsuitable habitat, very few due to timber harvest (Hillis et al. 2003), so the impact of the 15 percent limit would be small.

Alternative B
Under Alternative B, the 15 percent limit applies only to commercial timber sales. It does not limit prescribed fires or mechanical treatments like piling and brushing that do not produce commercial wood products.

Timber sale proceeds would not be available to offset project costs. The number of fuel treatments, including stewardship projects, could be reduced.

Alternative C
Under Alternative C, the mandatory standard becomes a less restrictive guideline, Guideline VEG G6. The need to treat fuels could be cited as a rationale to deviate from the guideline. Therefore, this alternative would have a limited effect on fuel treatments.

Alternatives D & E
Under Alternatives D and E, the direction is dropped altogether, so there is no effect.

Standard VEG S3
Standard VEG S3 would require maintaining ten percent denning habitat in an LAU. Denning habitat is most common in stands with plenty of coarse woody debris, which can provide fuel for fires.

Denning habitat is likely not limiting in most of the amendment area (Hickenbottom et al. 1999, p. 69) because most existing plans have direction to retain old growth or down woody debris. When an LAU doesn't have enough denning habitat, all existing denning habitat plus areas with the potential to develop into denning habitat would have to be identified and maintained.

Alternatives B & C
Under Alternatives B and C, Standard VEG S3 would not allow fuel treatments in denning habitat or in areas with the most potential to develop into denning habitat, when less than ten percent exists in an LAU.

At most, this standard would affect fuel treatments in ten percent of an LAU. Since it does not affect the remaining 90 percent, there's likely to be little effect.

Alternative D
Alternative D would modify Standard VEG S3 by allowing the effects of fuel treatments to be mitigated. Treatments would need to leave enough overstory trees and coarse woody debris to provide den sites.

Generally, fuel treatments could be designed to meet the standard, so it would have very limited or no effect.

Alternative E
Under Alternative E, Standard VEG S3 would not apply to fuel treatments developed through a collaborative process; therefore, it would not constrain them.

Standard VEG S4
Alternatives B & C
Under Alternatives B and C, Standard VEG S4 would in most cases prohibit salvage harvest in disturbed areas smaller than five acres. The limit does not apply to disturbed areas larger than five acres, prescribed fires or to mechanical treatments like brushing and piling that don't produce commercial wood products.

While most fuel treatments could be designed to meet the objectives of Standard VEG S4, timber sale proceeds would not be available to offset project costs. The number of fuel treatments, including stewardship projects, could be reduced. Otherwise, the standard would have no effect or a very limited effect.

Alternatives D & E
Under Alternatives D and E, the mandatory standard is changed to a less restrictive guideline, Guideline VEG G7. Retaining small patches of dead trees would have to be considered, but salvage harvest could take place when there were reasons to deviate from the guideline.

Under Alternatives D and E, projects could be designed to meet Guideline VEG G7, so the guideline would have very limited or no effect.

Standards VEG S5 and VEG S6
Standard VEG S5 limits vegetation management projects that reduce winter snowshoe hare habitat in young regenerating forests; Standard VEG S6 imposes limits in multistoried forests.

Generally, young regenerating forests are not a high priority for fuel treatment. Young forests are less capable of supporting high intensity fire in stand replacing fire regimes. As these forests grow up, fuels accumulate and they become more susceptible to fires of greater intensity and magnitude and may become a priority for treatment.

Multistoried forests are more likely to be a priority for fuel treatment.

Alternative B
Under Alternative B, Standards VEG S5 and VEG S6 would allow precommercial thinning – thinning the understory trees that lack commercial value – only within 200 feet of structures. Prescribed burning or commercial timber sales could be used to treat fuels.

About 120,000 acres of NF lands could be treated for fuels in Montana winter snowshoe hare habitat during the next decade. Under Alternative B, about 60,000 acres – 36,000 acres in the WUI – could be relocated to avoid thinning in winter snowshoe hare habitat – see Table 3-28. However, since other treatment methods are available, the effect is likely limited.

Alternative C
Under Alternative C, Standards VEG S5 and VEG S6 would allow vegetation management projects only for research and within 200 feet of structures.

About 120,000 acres of NF lands could be treated for fuels in Montana winter snowshoe hare habitat during the next decade. Under Alternative C, all those treatments could be relocated to avoid reducing winter snowshoe hare habitat.

Where Standards VEG S5 and VEG S6 preclude fuel treatment, the ability to reduce fuels and fire risk could decrease. It's unknown if the standards would restrict the ability to treat fuels in critical places – each situation would have to be evaluated at the project level. It's possible effective treatment could be done instead in places that aren't hare habitat.

Alternative D
Under Alternative D, Standards VEG S5 and VEG S6 would allow precommercial thinning and other vegetation management projects either to restore tree species in decline or where the amount of winter snowshoe hare habitat is greater than the historic range – see the *Forests* section later in Chapter 3.

Fuel treatments that create openings would sometimes be allowed and may reduce fire spread and intensity. It's likely fewer treatments would have to be relocated to avoid winter snowshoe hare habitat under Alternative D but how many is unknown.

Alternative E
Under Alternative E, Standard VEG S5 would not apply to fuel treatments and Standard VEG S6 is changed to a less restrictive guideline, Guideline VEG S8. The need to treat fuels could be cited as a rationale to deviate from the guideline. Therefore, Standard VEG S5 and

Table 3-28. Fuel treatments in Montana possibly moved to avoid hare habitat in a decade

	Alt A	Alt B	Alt C	Alt D	Alt E
Inside WUI (380,000 acres fuel treatment projected)					
High density forests	0 acres	19,000 acres	38,000 acres	38,000 acres	0 acres
Low density forests	*0 acres*	*17,000 acres*	*34,000 acres*	*34,000 acres*	*0 acres*
Outside WUI (160,000 acres fuel treatment projected)					
High density forests	0 acres	13,000 acres	27,000 acres	27,000 acres	0 acres
Low density forests	*0 acres*	*11,000 acres*	*21,000 acres*	*21,000 acres*	*0 acres*
Total (540,000 acres)					
Total	0 acres	60,000 acres	120,000 acres	120,000 acres	0 acres

It's possible some fuel treatments in low density forests would not need to be relocated because they may lack the horizontal cover needed to provide winter snowshoe hare habitat – see *Lynx* section.

Guideline VEG G8 would have little to no effect on fuel treatments.

Effects summary

Alternative B

Alternative B would affect the ability to conduct some fuel treatments. In most cases, fuel treatments either would meet the terms of the standards or could be designed to avoid lynx habitat components.

Alternative B could limit the ability to reduce fire risk to communities in the one percent[6] of the WUI that may be winter snowshoe hare habitat.

Alternative B also limits the ability to reduce fire risk to communities in less than one percent[7] of the area *outside* the WUI and wilderness.

Alternative C

Alternative C would affect the ability to conduct some fuel treatments. In many cases, fuel treatments either would meet the terms of the standards or could be designed to avoid lynx habitat components.

Alternative C could limit the ability to reduce fire risk to communities in the two percent[8] of the WUI that's winter snowshoe hare habitat.

Alternative C also limits the ability to reduce fire risk to communities in less than one percent[9] of the area *outside* the WUI and wilderness. However, since 75 percent of winter snowshoe hare habitat falls in Condition Class 1, it's not likely to be a priority for treatment, so the effect would be limited.

Alternative D

Alternative D also would affect the ability to conduct fuel treatment, but to a lesser degree than Alternative C. Some standards become guidelines and more activities are allowed. It provides more options for designing fuel treatments.

Alternative E

Alternative E would allow all fuel treatments to occur.

Air quality

The proposed action and other action alternatives would not add management direction that would change the effects on air quality compared to existing plans.

Although the amendment would add objectives that encourage using fire, it would occur as described under existing plans. Future treatments would analyze the effects on air quality based on current laws and regulations.

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[6] See Tables 3-26 and 3-28
36,000 acres/3,578,000 acres = 1%

[7] 24,000 acres/8,335,000 acres = 3/10%

[8] 72,000 acres/3,578,000 acres = 2%

[9] 48,000 acres/8,335,000 acres = ½%

Cumulative effects

Fire suppression has reduced the amount fire in Rocky Mountain forests since the early 1930s. Because these forests evolved with fire, its absence has altered forest conditions and health. Changes include increases in forest cover and density, and decreases in trees that can't tolerate shade like pines and western larch. Fuel loads are unnaturally high.

As a result, the health of some forest ecosystems is in decline, especially in the warm, dry, low-elevation forests where fire used to occur frequently. Lynx habitat does not occur in such forests.

Under the *National Fire Plan* and the *10-Year Comprehensive Strategy*, fire suppression would continue, but the Forest Service and BLM would implement fuel treatments targeting the highest risk communities and forest ecosystems. This amounts to areas close to where people live with an understory or mixed-severity fire regime.

Fuel treatments would be less likely in lynx habitat, which predominately occurs in the high elevation spruce-fir and lodgepole forests with stand-replacing fire regimes and which are closer to the historic condition.

While fire exclusion has not yet significantly altered forests that evolved with infrequent fires, landscape changes are noticeable (Keane et al. 2002). Forests with young age class trees are often missing. Fuel treatments could benefit lynx by creating young stands that would develop into high-quality winter snowshoes hare habitat.

Alternatives A, B, C, D & E
Some fuel treatments could be necessary where lynx habitat is susceptible to fire and close to a community. Alternatives A and E would allow such treatments in winter snowshoe hare habitat. Alternative B would allow many treatments, and Alternatives C and D would preclude more.

Forests

This section describes the forested environment of the amendment area and the effects of the alternatives. The *Economics* section later in Chapter 3 provides more information about the economic effects, particularly about the proposed precommercial thinning restrictions. More information can be found in the Project Record.

Disturbance regimes

Wildfire

Wildfire plays a major role in determining forest structure, composition and landscape patterns in the northern Rocky Mountains. Fire history data from the Interior Columbia Basin region shows extensive fire activity at least every decade or two between the mid-1500s and the early 1900s (Barrett et al. 1997). An estimated 12 million acres burned in the northern Rockies between 1908 and 1947 (Lotan et al. 1985). The largest known fire years since 1900 each burned from two to three million acres in the Interior Columbia Basin region (Arno, records on file, Intermountain Fire Sciences Lab, Missoula, MT).

Wildfire plays a major disturbance role in the higher elevations (Reudiger et al. 2000). Although lynx habitat typically has mixed severity to stand-replacing fire regimes, some fires are low intensity, which allow some tree species to survive fire. See the discussion in the Chapter 3 *Fire* section.

Species such as western larch, lodgepole pine, ponderosa pine quaking aspen, western white pine and whitebark pine have adapted to fire as a major disturbance agent (Fischer & Bradley 1987; Smith & Fischer 1997). Due to fire suppression during the last 80 years, many of these species have declined (Quigley et al. 1996).

Logging

Logging has changed the landscape in some places. Extensive salvage logging took place after mountain pine beetles killed many trees during the 1960s through the 1980s in large areas in the southern and eastern parts of the northern Rocky Mountains.

The cedar-hemlock zone in north Idaho and the larch-lodgepole forests of western Montana, also have a history of logging on the more accessible terrain.

Timber harvest in these areas has contributed to the quantity of young regenerating forests, although fire has had a much greater impact.

Stand initiation stage

A forest's *structure* consists of its appearance, species composition, growth, resistance to disturbance, etc. The structure is largely set by the spatial arrangement and heights of the trees by the time they reach the stem exclusion stage – see Figure 3-2 in the *Lynx* section. Precommercial thinning generally takes place in the stand initiation stage, before stem exclusion has occurred, and sets the stage for the future.

In mixed-species forests, dominant trees in the understory often grow rapidly after thinning releases them from competition. Species that need full sun die if they become much suppressed; they must be thinned when the trees still have large enough crowns to respond (Oliver & Larson 1996). Severely suppressed trees may never respond.

Most precommercial thinning occurs on lands in the suitable timber base. Historically, trees were thinned to a uniform spacing to improve growth and yield of future wood products.

The management objectives for the suitable time base have been broadened to include ecosystem and restoration purposes (USDA FS 1997b). Today, precommercial thinning using variable spacing is commonly used to promote structural and compositional diversity and to promote the historic representation of forest cover types.

Daylight thinning
Daylight thinning is a modified version of precommercial thinning that could preserve most of the forage and still provide relief from crowding for trees that need full sun. *Daylight thinning* would remove no more than 20 percent of the small trees and shrubs that provide winter snowshoe hare habitat. An area from eight to 20 feet in diameter would be cleared around the best performing trees; no trees or shrubs would be removed outside the cleared area.

- If eight-foot-diameter clearings were used, about 150 trees per acre could be released
- If 20-foot-diameter clearings were used, less than 30 trees per acre would be released

Western white pine
Western white pine *(Pinus monticola)* grows in the moist forests in northern Idaho and western Montana. This tree has been in major decline over the past 60 years.

The proportion of western white pine declined from 44 percent in 1941 to five percent in 1979 (Graham 1990). Since the 1930s, more than 95 percent of western white pine cover types have converted to grand fir, Douglas fir or western red cedar/western hemlock (USDA FS 1998). Only about 90,000 acres in north Idaho and western Montana still exist in the western white pine cover type, according to FIA data.

Western white pine blister rust (*Cronartium ribicola*) spread to the Pacific Northwest from Europe by the 1920s (Graham et al. 1993) and killed many trees

in northern Idaho. Naturally occurring rust-resistant wild trees were discovered in the 1940s; genetic resistance is carried in a low percentage of the population. It's the basis of selection to increase the frequency of resistant genes in western white pine planting stock (Byler et al. 1993). As such, rust-resistant trees are an important part of the genetic resource program.

Fire suppression and logging changed the distribution of western white pine. In pre-settlement times, low- and intermediate-intensity burns produced an irregular, patchy mosaic of vegetation. Fires frequently shortened how long the dense stem-exclusion stages lasted by thinning them and breaking holes in uniform canopies (Zack & Morgan 1994).

Western white pine is well adapted to mixed-severity fire regimes. In fact, it depends on the disturbance fire or timber harvest provides to remove competing conifers and allow it to become established (Graham 1990). Its relatively thin bark and moderately flammable foliage make it intermediate in fire resistance (Graham 1990). In the past, fire removed the competing conifers (Graham 1990).

Restoring western white pine
Restoring western white pine involves planting trees that can resist blister rust and thinning them (USDA FS 1998). About 96,000 acres were planted in FS Region 1 to rust-resistant western white pine between 1973 and 2001.

Neither natural forests nor plantations of western white pine respond well to thinning after they are 30 years old (Graham et al. 1993). Precommercial thinning reduces the probability of insect and disease attacks and stand-replacing fires by removing shade-tolerant trees.

About 70,700 acres of western white pine are scheduled for precommercial thinning during the next decade; 51,090 acres are in lynx habitat. See Table 3-29.

The thinning would help the planted trees survive and give them a competitive advantage over competing trees, without relying on other disturbances. The seed source these rust-resistant trees represent is vital to the future of western white pine forests on the landscape.

Alternative A, no action
Precommercial thinning would continue, allowing planted rust-resistant western white pine to successfully compete with shade-tolerant trees. About 70,700 acres could be precommercially thinned – this amounts to almost 75 percent of the western white pine planted during the last 20 years. The no-action alternative would contribute to restoring this species.

Even if full funding is not received, these acres are the number one priority for thinning in FS Region 1; therefore, it's likely all 70,700 acres of thinning scheduled in planted western white pine would occur.

Table 3-29. Planted western white pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Western white pine	51,090 acres	19,610 acres	70,700 acres

Alternatives B, C & E
Alternatives B, C and E would defer precommercial thinning on 51,090 acres inside lynx habitat. It's likely the white pine seedlings planted would not reach maturity unless something disturbs the plantations, because the species can't compete without disturbance.

White pine does not respond to delayed thinning, after the forest no longer provides winter snowshoe hare habitat and the trees are 45 years old.

The likely result of Alternatives B, C and E would be the loss of white pine on more than 70 percent of these planted acres, the species' continued decline and the loss of most of the investment in these plantations.

Alternative D
Under Alternative D, daylight thinning could be used to restore planted western white pine while retaining winter snowshoe hare habitat. The investments in rust-resistant trees could be protected on the 51,090 acres in lynx habitat.

Generally, trees were planted at a density of 300 per acre. Using daylight thinning, depending on the spacing, from about 150 to less than 30 trees per acre would be protected.

This restricted approach to thinning would not release all the planted trees from competition and may not be the ideal approach to restore this species, but some would survive into maturity and produce rust-resistant seed, resulting in future generations of rust-resistant trees. Alternative D is likely to maintain and restore this species.

Whitebark pine
Whitebark pine (*Pinus albicaulis*) is a hardy subalpine conifer that tolerates poor soils, steep slopes and windy exposures. It grows at higher elevations across much of the northern Rockies.

Currently, whitebark pine is found mainly at the timberline. It's a component of many habitat types and is distributed across a variety of site conditions in the amendment area.

In lynx habitat, whitebark pine is found in productive places where it grows densely with western white pine, spruce and fir. It also grows in sparse clusters on harsh, rocky places in the upper sub-alpine zone. Harsh whitebark pine sites do not support the stem densities capable of supporting hare populations and are not considered lynx habitat.

Whitebark pine is hardier than other conifers and can become established on dry, cold subalpine sites. It's a relatively slow growing tree and can be out-competed for growing space by conifers that are more shade tolerant. Where it competes with other species that need full sun, whitebark pine is often able to maintain its presence (Tomback et al. 2001).

Historically, whitebark pine accounted for ten to 15 percent of the forest cover in the northern Rocky Mountains (Arno & Weaver 1990); now it amounts to only about five percent. In the amendment area, about 1.5 million acres are in the whitebark pine cover type. Blister rust and fire suppression have substantially reduced its presence. Epidemics of

mountain pine beetles have further reduced isolated populations.

Historically, mixed severity fires maintained whitebark pine at high elevations by removing competing species. Without fire, whitebark pine is eventually replaced by subalpine fir and spruce. The long-term consequence of keeping fire out is changing the fire regime from mixed severity to stand – replacing (Arno & Hoff 1990; Keanne et al. 2002).

Restoring whitebark pine

Restoring historic fire regimes at the landscape level would be the most successful restoration technique for whitebark pine (Tomback et al. 2001; Keane et al. 2000; Arno pers. com.). Indeed, the viability of the species may depend on broad-scale landscape solutions (Keane et al. 2000). In national parks and wilderness areas where larger landscape fires may be allowed to burn, both prescribed fire and silviculture practices can be used (Tomback et al. 2001). Prescribed fire has been used experimentally to restore whitebark pine on a small scale.

In a practical sense, restoring a historic fire regime throughout the range of whitebark pine would be difficult. Silvicultural treatments that imitate the effects of a mixed fire regime – primarily thinning and precommercial thinning in subalpine fir habitat types – are recommended (Tomback et al. 2001; Arno pers. com.). Thinning out understory shade-tolerant trees is one alternative to fire that can create openings in the forest canopy and imitate the results of the low- and mid-intensity fires. Precommercial thinning combined with fire, followed by planting blister-rust resistant seedlings, may be the best way to restore these communities (Tomback et al 2001).

When a new whitebark pine stand grows up after fire, it may be overly dense and need thinning. Thinning whitebark pine is not recommended in places that are at high risk for blister rust because the disease may attack and kill nonresistant trees (Tomback et al 2001). It's also possible that thinning the competing conifers and shrubs could create habitat for the alternate host of blister rust, although forest openings that receive less than 80 to 90 percent full sunlight will generally not support the alternate host (Tomback et al. 2001).

About 9,110 of the 9,360 acres of the precommercial thinning in whitebark pine scheduled for the next decade are in lynx habitat – see Table 3-30. Another 51,000 acres in lynx habitat are planned for prescribed fire without thinning. Some of these acres are likely winter snowshoe hare habitat.

Alternative A, no action

Precommercial thinning that favors whitebark pine may take place during the

Table 3-30. Whitebark pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Whitebark pine	9,110 acres	250 acres	9,360 acres

next decade on 9,360 acres under the no-action alternative if fully funded. Most of this thinning is in lynx habitat. The no-action alternative would allow precommercial thinning and other restoration activities like prescribed fire to help maintain and restore whitebark pine.

Alternatives B & C
Alternatives B and C would defer precommercial thinning in lynx habitat until the forests self-pruned above the reach of snowshoe hares. These alternatives would result in the continued decline of whitebark pine on 9,110 acres in lynx habitat. Some decline would likely continue anyway unless full funding was received, and there is no guarantee of that.

Under Alternative B, other restoration activities such as prescribed fire could still take place to help whitebark pine.

Under Alternative C, Standards VEG S5 and VEG S6 would preclude using prescribed fire in winter snowshoe hare habitat, leaving no tools except wildfire to restore whitebark pine, and resulting in an even greater decline.

Alternatives D & E
Alternative D would allow using whatever methods are needed to restore and maintain whitebark pine. Alternative E would allow projects that restore fire-adapted ecosystems to restore whitebark pine.

Restoring whitebark pine forests could involve removing competing vegetation and returning fire to the landscape. Removing competing vegetation would improve the vigor and growth of individual trees, improving its ability to survive future fires and produce seed to regenerate naturally.

Assuming full funding, about 9,110 acres of whitebark forests in lynx habitat could be precommercially thinned in the next decade.

Quaking aspen
Quaking aspen *(Populus tremuloides)* is a species that needs full sun that commonly grows in even-aged forests. Aspen is distributed throughout the northern Rockies in small, isolated areas, and is more extensive east of the Continental Divide in Montana and in the southern half of the amendment area in Wyoming and Utah (Mueggler 1985). About 500,000 acres of aspen grow in the amendment area, according to FIA data.

Some single-storied aspen forests have two distinct generations, consisting of a more or less substantial scattering of old veterans that stand among younger, more slender trees. The older trees usually are survivors of fire a decade or more earlier that killed many of them and gave rise to the younger trees. Many of the younger trees grow as tall as the older ones, and with them, form a closed canopy (Jones & DeByle 1985).

Conifers growing beneath aspen are generally younger than the aspen because aspen regenerates so quickly from existing roots (Sheppard & Jones 1985).

Fire has been the most important disturbance factor in aspen, changing structural stages and composition and minimizing competition by conifers. If fire takes place infrequently (every 50 years or so) and is intense enough to kill

most or all of the aspen trees and the competing conifers, aspen is retained (Jones & DeByle 1985).

Mixed-severity fires where aspen grow at mid- and high elevations historically regenerated to this species and maintained these stages in balance. Severe or repeated burns may reduce site quality, resulting in reduced growth rates.

From 50 to 70 percent of the quaking aspen in FS Region 1 has been lost because of fire suppression and grazing (USDA FS 1998). Grass, forbs, shrubs or conifers may replace aspen in the absence of fire (Jones & DeByle 1985). Many aspen forests are threatened with invasion by shade-tolerant conifers.

Restoring quaking aspen
Silvicultural treatments at the stand scale have been too small to effectively maintain quaking aspen at the landscape scale (USDA FS 1998). Without fire, human intervention appears to be necessary for the continued well-being of aspen (Jones and DeByle 1985).

Precommercial thinning to restore aspen is scheduled in 6,120 acres of young forests during the next decade; 3,050 acres are in lynx habitat. See Table 3-31.

Alternative A, no action
When conifers compete with aspen, precommercial thinning can lengthen the time aspen has a competitive advantage. If fully funded, precommercial thinning may take place on 3,050 acres in lynx habitat, so aspen could be retained.

Alternatives B, C & E
Alternatives B, C and E would not allow precommercial thinning in lynx habitat until forests have self-pruned above the reach of snowshoe hares. Precommercial thinning would be deferred on about 3,050 acres in lynx habitat. Some precommercial thinning may be allowed under Alternative E if the purpose is to restore fire-adapted ecosystems.

Conifer encroachment would result in reducing aspen dominance, reducing the likelihood aspen would be able to regenerate from root suckering and dominate future generations by overwhelming a site with suckers.

Although the alternatives do not affect many acres, without the compensating results of returning fire to the landscape, aspen would likely continue its decline and become an even smaller part of the ecosystem.

Alternative D
Alternative D would allow precommercial thinning to restore aspen. Conifers would be removed, so aspen can establish a healthy root system capable of suckering or sprouting when the stand is next disturbed by fire or harvest. Thinning would give it a competitive advantage and encourage it as hare forage.

Table 3-31. Quaking aspen precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Quaking aspen	3,050 acres	3,070 acres	6,120 acres

Aspen forests may be maintained and restored on up to 3,050 acres in lynx habitat if fully funded.

Western larch

Western larch *(Larix occidentalis)* is found in northern Idaho and western Montana. Larch grows in diverse habitats, ranging from moist Douglas fir and grand fir, western red cedar and western hemlock, to cooler sub-alpine fir sites.

Larch is the conifer species that most needs full sun in the northern Rockies. It regenerates in full sunlight and large openings after major disturbance. To survive, larch must maintain a dominant position in the stand. If overtopped by other trees, larch growth will slow and the trees usually die (Fielder & Lloyd 1995).

Larch is extremely well adapted to fire. Mature larch have bark that's often more than six inches thick, containing little resin, with branches far above the ground and foliage of low flammability.

Larch is able to tolerate crown scorch and defoliation, producing new foliage and re-branching on the trunk. At least some of the old larch usually survives even intense fires, at least long enough to produce a seed crop to regenerate receptive seedbeds (Schmidt & Shearer 1995).

Even young larch wounded at the base of the stem in a surface fire, heal and continue to grow for centuries. On burned seedbeds, larch seedlings generally outgrow their competitors (Arno & Fischer 1995).

Historically, fire maintained larch (Schmidt & Shearer 1995). Stand-replacing fires burned moist larch sites at mean intervals of from 120 to 350 years. Low- to intermediate-intensity fires favored larch by thinning out much of the competition (Arno & Fischer 1995; Carlson et al. 1995).

After fire, a residual cover of 20 percent or fewer large trees was common historically (Quigley et al. 1996). This structure of large residual trees, occurring singly or in small groups, has declined in many areas. The big larch has been logged out in many places.

In moist places lacking fire or thinning, trees that are more shade-tolerant can replace larch in 90 to 140 years. With fire or thinning, larch can maintain dominance for 200 years or more.

Western larch has declined in the northern Rockies because of fire suppression and logging (USDA FS 1998). Tree species composition has shifted to shade-tolerant Douglas fir, grand fir and lodgepole pine. Because of the shift, current fire-return intervals are longer than 100 years and fire behavior is more extreme, rather than the combination of fires that favored larch (USDA FS 1998).

Table 3-32. Western larch precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Western larch	123,160 acres	45,280 acres	168,440 acres

Restoring western larch
Much of the remaining young larch is too dense to survive to maturity (USDA FS 1998). Restoring western larch includes precommercial thinning to maintain its competitive advantage and insure progress into mature trees that can help areas naturally regenerate after fire.

Precommercial thinning is an important approach to help restore western larch and is scheduled on 168,440 acres of young forests during the next decade; 123,160 acres are in lynx habitat – see Table 3-32.

Alternative A, no action
The no-action alternative would continue the current precommercial thinning program, increasing the probability of developing a structural component of old-growth larch that can survive fire to regenerate future forests. If fully funded, precommercial thinning may take place on up to 123,160 acres in lynx habitat.

Many larch plantations lack an overstory – without thinning, they may never develop into mature trees that can survive fire. The no-action alternative would maintain larch on the landscape by imitating natural disturbance processes.

Alternatives B, C & E
These alternatives would restrict precommercial thinning in lynx habitat until the forests no longer provide winter snowshoe hare forage, and larch likely would continue to decline there.

Many of these forests lack the mature, fire-resistant trees capable of reseeding burned landscapes consistent with historic patterns. Since large trees are missing, without extensive fire and expensive artificial regeneration, larch likely would continue to decline on about 123,160 acres in lynx habitat.

Some thinning may be allowed under Alternative E if the purpose is to restore fire to the ecosystem.

Alternative D
Alternative D would permit daylight thinning, retaining up to 80 percent of the winter snowshoe hare habitat. Thinning would release young larch from suppression, so large trees could develop, survive fire and re-seed future forests.

Trees would be selected randomly, depending on where the healthiest larch stems were found. To retain 80 percent of the cover, about 20 trees per acre could be daylight thinned to a radius of 12 feet.

This restricted approach to thinning would help return the competitive advantage to this fire-resistant species that needs full sun. Daylight thinning would not protect all the trees and may not the be the ideal approach to restore this species, but some would survive into maturity and produce seed, resulting in future generations and resulting in long-lived snags. Alternative D would help maintain this species on the landscape.

Daylight thinning in lynx habitat would provide enough trees to perpetuate the species through natural regeneration after stand-replacing fire. If fully funded, about 123,160 acres of larch could be thinned in lynx habitat.

Ponderosa pine

Ponderosa pine *(Pinus ponderosa)* is not significantly represented in lynx habitat in the northern Rockies. Generally, it grows in places too dry to support snowshoe hare and lynx; however, it is represented in lynx habitat in the warm, moist cedar forests of northern Idaho and western Montana.

Fire has played a major role in cedar forests with ponderosa pine. The diverse species and structures indicate pre-settlement fire patterns were highly variable. Shorter fire-return intervals likely favored ponderosa pine. Most cedar forests experienced mixed-severity fire. The ponderosa pines were able to survive some stand-replacing fires (Smith & Fischer 1997).

In most of lynx habitat, shade-tolerant trees out-compete ponderosa pine without some disturbance that reduces stem densities. Even if fire were returned to these ecosystems, the younger ponderosa pine would need to be thinned out for them to grow large enough to be able to endure fire. In many places, timber harvest has removed the large pines. In other places, the big trees are so stressed from high understory stem densities that needle diseases and bark beetles are killing them at high rates.

Historically, ponderosa pine forests developed because frequent low-intensity surface fires killed the competing conifers and prepared a seedbed for the pine (Steele 1987). Low-intensity fires helped maintain them because sapling and larger ponderosa pine are more fire resistant than most other species (Oliver & Ryker 1990; Saveland & Bunting 1987).

Restoring ponderosa pine

The small, low-intensity fires are no longer occurring. Instead, even-aged harvest and the changes in wildfire during the last 80 years, mean that more disturbances will be needed to maintain ponderosa pine as a major component.

With full funding, 11,660 acres of ponderosa pine could be precommercially thinning during the next decade in lynx habitat – see Table 3-33.

Alternative A, no action

The no-action alternative would help maintain ponderosa pine forests in lynx habitat, resulting in more-resilient ecosystems because they would contain fire-adapted species. About 11,660 acres of ponderosa pine in lynx habitat would be precommercially thinned under the no-action alternative if fully funded.

Alternatives B, C & E

These alternatives would restrict precommercial thinning in lynx habitat. Ponderosa pine is both more shade-tolerant than larch and less fire resistant. Restricting precommercial thinning would have a similar effect to what's described for western larch but on fewer acres. Some thinning may be allowed under Alternative E if the purpose is to restore fire to the ecosystem.

Table 3-33. Ponderosa pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Ponderosa pine	11,660 acres	48,450 acres	60,110 acres

Alternative D
Alternative D would allow daylight thinning in ponderosa pine, retaining about 80 percent of the winter snowshoe hare habitat. The ecological effects are similar to Alternative D for western larch.

About 11,660 acres would be thinned, giving them a chance to develop into large trees that can survive fire. This restricted approach would not protect all the trees and may not the be the ideal approach, but some would survive into maturity and produce seed, resulting in future generations. Alternative D would help maintain this species on the landscape.

Lodgepole pine
Lodgepole pine *(Pinus contorta)* is the main cover type on about seven million acres in the amendment area. Extensive landscapes of near-pure lodgepole or lodgepole/spruce/fir are common in the eastern and southern half of the amendment area. Lodgepole pine grows larger and mixes readily with western larch, grand fir and western white pine on moister sites in the northern and western portion of the amendment areas.

Lodgepole is a short-lived tree in western Montana and northern Idaho, and long-lived in eastern Montana and the central Rocky Mountains. Lodgepole is fire-adapted, establishing itself on burned areas (Lotan et al. 1985). Stocking can be as high as 10,000 to 40,000 stems per acre. Most lodgepole forests in the Rocky Mountains were established because of fire.

Historically, fire burned more frequently in lodgepole pine than previously believed. It used to be considered that lodgepole forests were merely the result of stand-replacing fires, but research has shown fire-free intervals of only 22 to 50 years in many lodgepole-dominated forests (Lotan et al. 1985), suggesting fire reduced stand densities. This indicates fire plays a role in both establishing and perpetuating lodgepole pine.

The effects of low-intensity fires in lodgepole forests depend on the availability of seed and amount of duff removed. These low-intensity fires removed some trees, allowing others to grow into large trees. Without some disturbance, lodgepole forests become quite dense with small-diameter stems, small crowns and little diversity.

Except for extensive timber harvests in eastern Montana in the 1950s and 1960s, and mountain-pine-beetle salvage harvests in the southeast part of the amendment area in the 1970s and 1980s, fire suppression has resulted in extensive areas of mature lodgepole.

Much of it is susceptible to infestation by mountain pine beetles – large-scale infestations result in conditions favorable to stand-replacing wildfires or succession to shade-tolerant species (USDA FS 1998).

Table 3-34. Lodgepole pine precommercial thinning scheduled next decade

	Inside lynx habitat	Outside lynx habitat	Total
Lodgepole pine	34,550 acres	6,420 acres	40,970 acres

Restoring lodgepole pine old growth
Precommercially thinning young lodgepole has a dramatic effect on their ability to grow to large diameters (Lotan & Perry 1983). Differences of from four to six inches in diameter were observed by the time the trees were 90 years old, depending on whether there were 500 trees per acre or 2,500.

Studies have shown that unless lodgepole is released from suppression when very young, stagnant growth persists after reductions in density. High stand densities reduced crown diameters and changed the distribution of foliage (Bassman 1984). In some situations, precommercial thinning is necessary to grow merchantable trees.

To provide old growth stand conditions, lodgepole requires disturbance to reduce stem densities. About 35,000 acres of lodgepole pine have been scheduled for precommercial thinning to provide for future old growth in lynx habitat – see Table 3-34.

Alternative A, no action
Although not an exact substitute, precommercial thinning can have results similar to low-intensity fires. Alternative A would continue precommercial thinning to develop old-growth lodgepole pine and improve sawtimber yields and product value on up to 34,550 acres in lynx habitat if fully funded.

Alternatives B, C & E
Alternatives B, C and E would defer precommercial thinning on 34,550 acres in lodgepole forests in lynx habitat, until the forests no longer provide winter snowshoe hare forage.

Generally, precommercial thinning would be deferred until the trees are about 45 years old. Allowing high stem densities to persist beyond 45 years can result in high stem densities and with little diversity, producing a landscape out of equilibrium after stand-replacing fire (Shaw 2002).

Delaying thinning until the trees are 45 years old results in tall, skinny trees, with little or no live crown, meaning they have little or no capacity to grow. If they are thinned after age 45, they're easily damaged or felled by snow and wind, and heavy fuels result.

Delaying thinning also allows mountain pine beetles to become active earlier in larger trees, shifting stand structure away from goshawk nesting habitat (Shaw 2002). Any future economic benefits of thinning would not be realized in lynx habitat.

Alternative D
Alternative D would allow precommercial thinning to provide future old growth stand conditions on up to 34,550 acres in the amendment area, if fully funded. Thinning would help add structural diversity to these forests and landscapes.

Table 3-35. Research & genetics precommercial thinning next decade at full funding

	Inside lynx habitat	Outside lynx habitat	Total precommercial thinning
Research	1,450 acres	80 acres	1,530 acres
Genetic tests	220 acres	320 acres	540 acres

Research program
About 1,450 acres would be thinned to complete research studies in lynx habitat if fully funded during the next decade. Most of this research is designed to understand the effects of various thinning methods on tree composition and growth and its effect on wildlife, such as how snowshoe hares respond to various thinning methods.

Genetic resource program
About 220 acres of the 540 acres of genetic test sites are inside lynx habitat – see Table 3-35. Genetic test sites are plantations established to determine the genetic worth of particular families and trees for future breeding programs (Howe et al. 1996). The plantations are thinned after the test trees begin to compete with one another.

Alternative A, for research
Using precommercial thinning for various research objectives would continue on 1,530 acres if fully funded; 1,450 acres are inside lynx habitat. Research objectives, such as spacing trials on timber productivity, effects on snowshoe hare populations and effects on other wildlife, would be met.

Under Alternative A, long-term genetic tests would continue to be implemented according to Regional Tree Improvement Plans on about 540 acres; 220 acres are in lynx habitat.

Alternative B for research
Alternative B would not allow precommercial thinning for research needs. Eliminating research in lynx habitat could prevent us from understand more fully the effects of different precommercial thinning prescriptions on winter snowshoe hare habitat.

Alternative B also would not allow precommercial thinning for genetic tests on the 220 acres in lynx habitat. Although not a large part of the precommercial thinning program, the tests and trials are important in the development of improved planting stock. Restricting precommercial thinning would eliminate the potential to implement established research, designed to evaluate the genetic material in the appropriate environment.

Alternatives C, D & E for research
Alternatives C, D and E would allow precommercial thinning for research needs and for long-term genetic tests; therefore, the effects would be the same as Alternative A.

Summary of precommercial thinning in the stand initiation stage

A variety of vegetation management projects may take place during the stand initiation phase. These projects may or may not reduce winter snowshoe hare habitat, depending on how much vegetation is removed and when.

Some projects don't reduce winter snowshoe hare habitat because they remove little cover or take place when the trees are not considered foraging habitat. Such activities include pruning western white pine to control blister rust, weed and release, cutting Christmas trees and digging landscaping trees for transplant. These activities either have limited effects or may be modified to limit their effects; therefore, they are not discussed further.

Project Record, Forests section provides additional detail.

Precommercial thinning generally does remove winter snowshoe hare habitat. Thinning takes place in thick stands when the trees have grown taller than the average winter snow is deep, when they are providing winter snowshoe hare habitat.

Almost 60,000 acres of precommercial thinning is scheduled to be done each year during the next decade in the amendment area – see Table 3-36. Of that, about 40,000 acres or about two-thirds is inside lynx habitat.

There is no guarantee of full funding. On the average in recent years, funding was received to thin only about 20,000 acres per year in the amendment area – see Table 3-36. Funding reductions affect all acres, not just those scheduled inside lynx habitat. See the *Economics* section later in Chapter 3 and Table K-6 in Appendix K for a discussion of historic average funding.

Table 3-36. Scheduled precommercial thinning allowed by alternative next decade

Precommercial thinning	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Total at historic average funding [1]	*198,270*	*65,880*	*66,400*	*142,350*	*66,400*
Total at full funding	580,960	187,010	188,680	420,910 [2]	188,680
Research	1,530	80	1,530	1,530	1,530
Genetic tests	540	320	540	540	540
Within 200 feet of dwellings	6,360	6,360	6,360	6,360	6,360
Restoration [3]	355,700	123,080	123,080	355,700	123,080
Planted western white pine	70,700 [4]	19,610	19,610	70,700	19,610
Whitebark pine	9,360	250	250	9,360	250
Aspen	6,120	3,070	3,070	6,120	3,070
Western larch	168,440	45,280	45,280	168,440	45,280
Ponderosa pine	60,110	48,450	48,450	60,110	48,450
Lodgepole pine	40,970 [5]	6,420	6,420	40,970	6,420

Acres are those scheduled during the next decade in the amendment area; actual acres could change.

[1] *All other figures are based on full funding – assumes historic average 34 percent of program request* – see the *Economics* section, Table K-6 in Appendix K & the vegetation section of the Project Record

[2] The figure for Alternative D does not include what might be allowed if a broad-scale assessment found winter snowshoe hare forage conditions exceed the historic range.

[3] Restoration = western white pine + whitebark pine + aspen + larch + ponderosa pine + lodgepole, both inside & outside lynx habitat if fully funded

[4] The figure for Alternative A represents only the planted rust-resistant western white pine scheduled to avoid loss of competitive advantage to competition from shade-tolerant trees. Total scheduled western white pine thinning is more than 70,700 acres.

[5] The figure for Alternative A represents only those lodgepole pine forests where thinning would be used to encourage old growth. Total scheduled lodgepole pine thinning is greater than 40,970 acres.

Tables K-1 through K-6 in Appendix K show thinning data by unit.

Effects in the stand initiation stage

Precommercial thinning is the primary vegetation management activity in the stand initiation stage. It can be done to restore and perpetuate rust-resistant western white pine, whitebark pine, aspen, western larch, ponderosa pine and old growth lodgepole pine in the absence of wildfire or other disturbances.

Standard VEG S5 would defer precommercial thinning in winter snowshoe hare habitat in the stand initiation stage. Most, if not all of the precommercial thinning program is scheduled in these young regenerating forests.

Standard VEG S6 would also defer precommercial thinning; however, VEG S6 focuses on lynx habitat in multistoried stages. Very little, if any precommercial thinning is scheduled in multistoried stages; therefore, the effects of this standard would be limited and it is not discussed further.

Alternative A, no action

Under Alternative A, the scheduled precommercial thinning program would not be affected. If full funding were available, up to 580,960 acres of thinning could take place in the amendment area during the next decade – 396,140 acres are in lynx habitat. If the precommercial thinning program were funded similar to historic average levels, up to 198,270 acres may take place during the next decade – see Table 3-37.

Alternative A would allow using precommercial thinning to restore up to 355,700 acres of species in decline to help retain them on the landscape. Thinning trees in dense young stands results in improved health and vigor (Oliver & Larson 1996). Growth would be concentrated on selected trees that have desired characteristics and future value would be improved where commercial harvest is desired. More trees would grow into large mature trees, especially in areas where fire is suppressed.

Alternative B

Under Alternative B, Standard VEG S5 would defer precommercial thinning in winter snowshoe hare habitat in the stand initiation stage, allowing only thinning within 200 feet of administrative sites, dwellings and outbuildings to create a space defensible from fire. This means that precommercial thinning would not take place until after the trees are 45 years old, and in most cases, would not take place at all.

This standard would result in deferring about 68 percent of the scheduled precommercial thinning, leaving 184,820 acres available during the next decade

Table 3-37. Alternatives A & B precommercial thinning next decade

	PCT inside lynx habitat	PCT outside lynx habitat	Total if fully funded	Historic average funding
Alternative A	396,140 acres	184,820 acres	580,960 acres	198,270 acres
Alternative B	2,190 acres	184,820 acres	187,010 acres	65,880 acres

mostly outside lynx habitat. Under the historic average funding, about 65,880 acres would be precommercially thinned during the next decade – see Table 3-37. Research and genetic tests on 1,670 acres would not take place.

If fully funded, restoration thinning on up to 232,620 acres in lynx habitat would be forgone. The delay until young forests no longer serve as winter snowshoe hare habitat has long-lasting consequences, to species that need full sun and are not able to tolerate dense stocking without a significant loss in live crown.

Without reducing stem densities, the ability to keep these species well represented would be seriously impacted. The impact is greatest on planted rust-resistant western white pine, the number one priority for thinning in FS Region 1, because almost three-quarters of the plantations ready for thinning are inside lynx habitat. Generally, the thinning allowed outside lynx habitat would be in drier places, where western white pine, whitebark pine and larch do not grow.

Delayed thinning can substantially increase the fuel loading. Fiber-thinning in previously un-thinned 50-year old lodgepole/larch forests on the Bonners Ferry Ranger District have resulted in considerable fuel loading, even when the material removed was used for pulp down to three inches in diameter. Fuel treatments on these thinned areas averaged $50 per acre (Barry Wynsma, pers. com.).

Alternative C

Under Alternative C, Standard VEG S5 allows vegetation management projects in winter snowshoe hare habitat in the stand initiation stage for research, genetic tests sites and within 200 feet of dwellings and associated outbuildings.

While the range of management activities affected has been broadened, the primary activity affected would be precommercial thinning. Alternative C would result in about 188,680 acres thinned in the next decade if fully funded, of which 3,860 acres would be in lynx habitat. Under historic average funding, only 66,400 acres would be accomplished – see Table 3-38.

The effects of Alternative C would be similar to Alternative B. If fully funded, restoration thinning would be forgone on up to 232,620 acres in lynx habitat.

Alternative D

Alternative D modifies Standard VEG S5 to allow a number of vegetation management projects:

- For a research and genetic test sites

Table 3-38. Alternatives C, D & E precommercial thinning next decade

	PCT inside lynx habitat	PCT outside lynx habitat	Total if fully funded	Historic average funding
Alternatives C & E	3,860 acres	184,820 acres	188,680 acres	66,400 acres
Alternative D	236,480 ‡ acres	184,820 acres	421,300 acres	142,350 acres

‡ For 185,910 acres, only 20 percent of the winter snowshoe hare forage would be removed

- Within 200 feet of dwellings or associated outbuildings
- To restore western larch, aspen, old growth lodgepole pine, ponderosa pine, western white pine and whitebark pine forests
- When a broad-scale assessment has found winter snowshoe hare habitat exceeds the range of historic conditions

Alternative D could result in thinning up to 421,300 acres in the next decade if fully funded; 236,480 acres are in lynx habitat. More acres could be thinned if a broad-scale assessment determines winter snowshoe hare forage conditions exceed the range of historic conditions. Under historic average funding, only 142,350 acres would be thinned – see Table 3-38.

Alternative D would contribute to restoring whitebark pine, aspen, ponderosa pine, western larch, and planted rust-resistant western white pine and old growth lodgepole pine. These species and structures require disturbance early in their life cycles to maintain them on the landscape.

Alternative E

Alternative E is similar to Alternative C, except that it allows precommercial thinning for fuel projects. Some thinning may occur to restore fire to the ecosystem. How many acres are involved is not known. It's most likely to take place in aspen and whitebark pine forests.

Older multistoried stages

Management actions in older multistoried stages

A multistoried structure generally forms as trees grow old and die and new trees regenerate underneath the canopy of older trees. Two older multistoried stages – the *understory reinitiation* and the *old forest multistoried* – can provide winter snowshoe hare habitat (Ruggiero et. al 2000a; John Squires, pers. com.).

In winter snowshoe hare habitat, an overstory layer of large trees grows above dense undergrowth of trees and shrubs with live crowns within the reach of snowshoe hares during winter when the snow is at its average maximum depth.

Some multistoried forests do not provide winter snowshoe hare habitat because the understory is not dense enough, or the understory live crowns are too far above the snow for the hares to reach.

FIA data for Montana was used to gauge how much lynx habitat exists in multistoried stages – for more discussion, see the *Lynx* section. About 1.5 million acres or 16 percent is multistoried and provides some level of winter snowshoe hare habitat – see Table 3-39 here and Table 3-2 earlier in the *Lynx* section.

About 75 percent is outside wilderness. It's likely that a similar percentage occurs in the rest of the amendment area, since western Montana is similar to northern Idaho, and eastern Montana is similar to Wyoming, Utah and southern Idaho. Vegetation management projects that may take place in multistoried forests are summarized in Table 3-39 and include:

Precommercial thinning
Precommercial thinning removes some small trees to improve the growing conditions for the remaining trees. Precommercial thinning takes place mostly in the young forests created by regeneration harvest or fires. Little precommercial thinning takes place in multistoried forests. Precommercial thinning can negatively affect snowshoe hare populations (Ruediger et al. 2000).

Understory thinning
Understory thinning, or thinning from below, removes smaller trees growing under taller ones, to remove ladder fuels or to improve the health and vigor of the overstory. Understory thinning may or may not provide commercial products.

Winter snowshoe hare habitat may or may not be directly affected depending on the size of trees removed. Winter snowshoe hare habitat would be affected if the entire

Table 3-39. Multistoried lynx habitat on NF lands in Montana

	Inside wilderness		Outside wilderness		Total	
High density forests	368,000 acres	4%	1,085,000 acres	12%	1,453,000 acres	16%
Low density forests	197,000 acres	2%	819,000 acres	9%	1,016,000 acres	11%
Total	565,000 acres	21%	1,904,000 acres	6%	2,469,000 acres	27%

understory were removed, including the trees within reach of hares. If mid-story trees are removed, some of the winter snowshoe hare habitat may be affected. Some winter snowshoe hare habitat could be removed by skid trails or logging systems.

Commercial thinning
Commercial thinning generally removes mid-story trees to reduce competition with other trees. Limited commercial thinning takes place in multistoried forests. The trees removed have commercial value. Winter snowshoe hare habitat would not be substantially affected because small trees are not removed, except in skid trails.

Even-age harvests
Even-age harvests include clearcuts, seed tree cuts and shelterwood harvests remove mid- and overstory trees with commercial value, to regenerate even-age forests. Clearcutting removes all the trees. Seed tree cuts retain some large trees and shelterwood cuts retain more overstory trees, until seedlings become established.

Typically, all the understory trees are removed; even-aged harvests remove winter snowshoe hare habitat.

Two-age harvests
Two-age harvests are clearcuts, seed tree cuts and shelterwood cuts that retain some overstory trees. They retain structural diversity and result in a two-age stand as an understory of younger trees regenerate. Typically, all the understory trees are typically removed in two-aged treatments; two-age harvests remove winter snowshoe hare habitat.

Uneven-age harvests
Uneven-age harvests remove trees with commercial value either individually or in groups. They maintain a multi-age structure by removing some trees of all sizes and by regenerating the openings.

Uneven-age harvests can either create or remove winter snowshoe hare habitat.

- If understory trees are removed during logging, forage could be lost.
- If openings are created providing space where young trees can grow, forage could be created.

Salvage logging
Salvage logging removes trees that are dead, damaged or dying to recover economic value. Salvage harvest typically results in removing the large overstory trees, but not the small understory trees that make up winter snowshoe hare habitat. Some small trees may be incidentally removed in skid trails or skyline corridors.

Prescribed fire
Prescribed fire removes the understory trees, and sometimes overstory trees as well, depending on the management objective. Prescribed fire may or may not include mechanical treatment such as slashing or understory thinning before burning. Prescribed fires remove understory trees and winter snowshoe hare habitat.

Effects in older multistoried stages

This analysis evaluates the effects of the alternatives on a variety of vegetation management projects that could take place in the multistoried forests. However, the

analysis is qualitative because there is little information on how many of the 1.9 million acres of multistoried lynx habitat outside wilderness are likely to need treatment. Effects on fuel treatments are discussed in the *Fire* section.

Other vegetation standards and guidelines that could affect timber harvest

Several other standards and guidelines may affect the ability to harvest timber in lynx habitat. They vary by alternative, and include:

- *Standard VEG S1:* Vegetation management projects would be restricted in LAUs with 30 percent or more unsuitable habitat. Unsuitable habitat includes areas that are regenerating following timber harvest or fire and the trees or shrubs are too short to provide forage and cover for snowshoe hares during winter. Generally, this stage exists for ten to 30 years after disturbance.
- *Standard VEG S2:* Timber harvest would be restricted in LAUs if it leads to 15 percent or more unsuitable habitat created during the past decade.
- *Standard VEG S3:* Vegetation management projects would be restricted when there is less than ten percent denning habitat in an LAU.
- *Standard VEG S4:* Generally, salvage logging would not be allowed in disturbed areas five acres or smaller. However, when field validation and mapping finds an LAU contains ten percent denning habitat well distributed, small patches may be salvage logged.
- *Guideline VEG G1:* Create winter snowshoe hare habitat where it's scarce or absent.

Alternative A, no action

Under the no-action alternative, no changes would be made to existing plans. Vegetative management projects would not be precluded in multistoried forests except as already precluded in existing plans.

Timber harvest and salvage logging could take place where currently allowed.

Alternative B

Standard VEG S6

Under Alternative B, Standard VEG S6 would not allow precommercial thinning that reduces winter snowshoe hare habitat in multistoried forests. It allows thinning within 200 feet of administrative sites, dwellings and outbuildings to create a space defensible from fire.

Under Alternative B, Standard VEG S6 defers only precommercial thinning or understory treatments. It does not defer prescribed burning, even-age, two-age, uneven-age or salvage harvests.

Table 3-39 on the following page shows which vegetation management projects that reduce winter snowshoe hare habitat in multistoried forests would be limited by Standard VEG S6 under the different alternatives.

Standard VEG S1

Under Alternative B, Standard VEG S1 would limit vegetation management projects when there is more than 30 percent unsuitable habitat in an LAU

Table 3-40. Projects allowed in multistoried winter snowshoe hare habitat under Standard VEG S6

Kind of project	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E†
Precommercial thinning	Yes, where allowed in plans	No, except near structures	No, except near structures or for research	Near structures, for research, for restoring whitebark pine, western white pine, larch, ponderosa pine & old growth lodgepole or when there's an abundance of multistoried winter snowshoe hare forage	Possible to deviate from Guideline VEG G8 with rationale
Understory thinning	Yes	Yes, if commercial No, if non-commercial	Same as above	Same as above	Same as above
Commercial thinning ‡	Yes	Yes	Same as above	Same as above	Same as above
Even-age harvest	Yes	Yes	Same as above	Near structures, to recruit forage in openings or when there's an abundance of multistoried winter snowshoe hare forage	Same as above
Two-age harvest	Yes	Yes	Same as above	Same as above	Same as above
Uneven-age harvest ‡	Yes	Yes	Same as above	To recruit forage in openings	To recruit forage in openings
Salvage ‡	Yes	Yes	Same as above	Near structures, to create openings or to improve or maintain forage	To recruit forage
Prescribed fire‡	Yes	Yes	Same as above	Near structures, to create openings, to improve or maintain forage, or for whitebark pine	Same as above

† Under Alternative E, Standard VEG S6 is dropped and replaced by Guideline VEG G8

‡ Vegetation management projects can take place without reducing winter snowshoe hare forage, depending on where the forage is and where the target trees are. It's likely that under Alternatives C, D and E, some foraging habitat would be removed – these projects would be deferred.

unless a broad scale assessment substantiates different historic levels.

Only a few LAUs (less than 13 percent in FS Region 1) exceed 30 percent, resulting from wildfires that burned large areas (Hillis et al. 2003).

Salvage harvest generally would not be constrained by this standard because removing dead trees does not create unsuitable habitat. The original disturbance created the unsuitable condition.

Standard VEG S2

Under Alternative B, Standard VEG S2 would limit timber harvests if they produced more than 15 percent unsuitable habitat in a 10-year period. About 13

percent of the LAUs in Montana have more than 15 percent unsuitable habitat, mostly resulting from wildfires.

Salvage harvest generally would not be constrained by this standard.

Standard VEG S3
Under Alternative B, Standard VEG S3 restricts projects in LAUs with less than ten percent denning if they remove vegetation from areas with the highest potential to develop denning habitat.

Generally, denning habitat is not likely a limiting factor in the amendment area (Hickenbottom et al. 1999). Where there's not enough, projects would be precluded, which would primarily affect salvage logging.

Standard VEG S4
Under Alternative B, Standard VEG S4 generally restricts salvage logging where trees have been killed in pockets smaller than five acres. However, it doesn't apply when an LAU has been mapped and field-verified to contain ten percent denning habitat.

It's likely many LAUs provide enough denning habitat, but some salvage may be precluded.

Guideline VEG G1
Under Alternative B, Guideline VEG G1 says projects should be planned to develop winter snowshoe hare habitat where it's lacking. A variety of projects could be done where there's less than 30 percent unsuitable habitat, or less than 15 percent created by timber harvest.

Summary for Alternative B
Alternative B may defer timber projects in some areas because of Standards VEG S1, VEG S2 and VEG S3. Guideline VEG G1 encourages vegetation management, including timber harvest to create winter snowshoe hare habitat.

It's likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. The effect of Alternative B on salvage projects is likely to be limited because it's likely many LAUs provide ten percent denning.

Alternative C

Standard VEG S6
Under Alternative C, Standard VEG S6 would not allow any vegetation management projects that reduce winter snowshoe hare habitat in multistoried forests but those:

- Within 200 feet of administrative sites, dwellings or outbuildings
- For research studies

This could increase insect and disease outbreaks. Understory trees are not distributed uniformly, so it may be possible to remove trees without affecting foraging habitat.

Standard VEG S6 also would defer prescribed fire and precommercial thinning to restore whitebark pine in some places. Whitebark pine treatments are planned on about 60,000 acres during the next decade.

It's not known how many of those areas provide winter snowshoe hare habitat. It's likely some areas would not be treated

due to this standard, further contributing to the decline of whitebark pine.

It's difficult to determine what effect this standard would have on timber sales. It's likely some activities would not occur in some places or would be deferred because of this standard.

Most timber harvest takes place on the suitable timber base, where timber harvest is allowed under existing plans. About half of the multistoried habitat that could provide winter snowshoe hare habitat is in the suitable timber base.

Standard VEG S1
Under Alternative C, Standard VEG S1 applies to multiple LAUs. Some projects that create more than 30 percent unsuitable habitat may be deferred but only where large fires burned, such as the 1988 Yellowstone and Canyon Creek fires (Hillis 2003).

Standard VEG S2 dropped, Guideline VEG G6 added
Under Alternative C, Standard VEG S2 is dropped and the management direction added in Guideline VEG G6. Guideline VEG G6 would have limited effect on timber projects both because it's a guideline and because few LAUs exceed 15 percent unsuitable caused by timber harvest. It generally would not affect salvage logging.

Standards VEG S3 & VEG S4
Alternative C includes the same version of Standard VEG S3 as Alternative B. It also includes Standard VEG S4, which would allow salvage logging on patches smaller than five acres next to homes. Generally, these standards would not limit timber or salvage projects because it's likely many LAUs provide enough denning habitat, but some projects could be deferred or dropped.

Guideline VEG G1
Under Alternative C, Guideline VEG G1 has been changed to encourage projects in the stem exclusion stage.

Summary for Alternative C
Alternative C may defer timber projects in some areas because of Standards VEG S1 and VEG S6 and Guideline VEG G6. Guideline VEG G1 encourages projects that create winter snowshoe hare habitat.

It's likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. The effect of Alternative C on salvage projects is likely to be limited because it's likely many LAUs provide ten percent denning.

Overall, fewer timber projects are likely to be deferred under Alternative C because Standard VEG S1 is less constraining.

Alternative D

Standard VEG S6
Under Alternative D, Standard VEG S6 would allow vegetation management projects that reduce winter snowshoe hare habitat in multistoried forests:

- Within 200 feet of administrative sites, dwellings or outbuildings
- For research studies
- To restore whitebark pine
- To restore or maintain western white pine, western larch, ponderosa pine so long as 80 percent of the winter snowshoe hare habitat is retained

- To develop future old growth characteristics in lodgepole pine
- To improve or maintain winter snowshoe hare habitat in the long term
- When a broad scale assessment determines that the amount of multistoried winter snowshoe hare habitat exceeds what's expected in the normal range of historic conditions.

Other projects would be deferred until forests no longer provide foraging habitat. Some projects would be allowed if they improve or maintain forage habitat in the long term.

Multistoried forests include a variety of conditions. Some forage habitat is likely to be growing out of reach of snowshoe hares – removing these trees under these conditions and initiating a new crop of trees could prolong forage.

Under Alternative D, it's difficult to determine the effect Standard VEG S6 would have on timber programs. Alternative D allows vegetation management projects under a variety of circumstances. One condition allows projects that improve forage over the long term – timber harvest could be used to create openings for new forage to develop. Still, it's likely some vegetation management projects would not take place because of this standard.

Alternative D would not interfere with efforts to restore whitebark pine. It would allow projects that restore and maintain this species.

Standard VEG S1
Under Alternative D, Standard VEG S1 applies to a sub-basin or isolated mountain range. The standard is likely to constrain vegetative management projects that create unsuitable habitat only in areas that had very large fires such as the 1988 Canyon Creek and Yellowstone fires (Hillis 2002).

Standard VEG S2 & Guideline VEG G6 both dropped
Alternative D drops Standard VEG S2 and Guideline VEG G6 as well, so they have no effect.

Standard VEG S3
Alternative D modifies Standard VEG S3 to let project design to mitigate any effects in denning habitat. Projects would still need to leave some overstory and enough coarse woody debris to provide den sites. Generally, salvage projects could be designed to meet these objectives.

Standard VEG S4 dropped, Guideline VEG G7 added
Under Alternative D, Standard VEG S4 is dropped and the management direction added in Guideline VEG G7. Retaining the small patches of dead trees would be considered, but salvage harvest could take place if there is reason to do so.

Summary for Alternative D
Alternative D may defer timber projects in some places because of Standards VEG S1 and VEG S6. Alternative D is not likely to affect timber projects, except even-age or two-age harvests where large fires have occurred.

It's likely there would be no change in overall timber outputs, but there may be changes in what material is harvested and where. Alternative D would have limited effects on salvage harvest.

Overall, fewer timber projects are likely to be deferred under Alternative D because Standards VEG S1 and VEG S6 are less constraining.

Alternative E

Standard VEG S1
Under Alternative E, Standard VEG S1 applies to multiple LAUs. Some projects that create more than 30 percent unsuitable habitat may be deferred but only where large fires had burned. The standard would not apply to timber harvest used to meet fuel treatment objectives.

Standard VEG S2 & Guideline VEG G6 both dropped
Alternative E drops Standard VEG S2 and Guideline VEG G6, the same as under Alternative D, so they have no effect.

Standard VEG S3
Under Alternative E, Standard VEG S3 would require leaving some overstory and enough coarse woody debris to provide den sites if denning habitat was lacking. It would not apply to salvage logging done for fuel treatment.

Standard VEG S4 dropped, Guideline VEG G7 added
Under Alternative E, Guideline VEG G7 would encourage retaining small patches of dead trees, but salvage harvest could take place with adequate rationale.

Standard VEG S6 dropped, Guideline VEG G8 added
Under Alternative E, Standard VEG S6 is dropped and the management direction added in Guideline VEG G8. The guideline recommends retaining winter snowshoe hare habitat in multistoried forests but allows timber harvest where understory forage is lacking.

Winter snowshoe hare habitat would have to be considered when designing timber projects, but it could be removed if reasons can be documented.

Summary for Alternative E
Alternative E has similar effects on timber harvest to Alternative C. Standard VEG S1 and Guidelines VEG G6 and VEG G8 may defer them in some areas, but Guidelines VEG G6 and VEG G8 also encourage projects creating winter snowshoe hare habitat where it's lacking. Timber harvest would not be precluded if done to meet fuel treatment objectives developed through a collaborative process.

It's likely there would be no change in overall timber harvest outputs, but there may be changes in what material is harvested and where. Alternative E also would not constrain fuel treatment, so it would have less effect on timber outputs than Alternative C.

The effects of Alternative E on salvage projects are similar to Alternative D.

Cumulative effects

Alternative A

On species of decline

Disturbance processes such as fire would continue to shape the landscapes of the northern Rockies. Fire suppression would also continue, resulting in forests with too many trees and continuing the change in species composition from those that depend on fire to those that do not. Efforts to restore species of decline would continue through reforestation, thinning and prescribed fire, cumulatively improving conditions over time.

On timber program

Past, present, and reasonably foreseeable actions listed in Appendix L have reduced the area available for timber harvest. Other tools, such as prescribed fire would be used to meet resource objectives in these areas.

Alternatives B, C, D & E

On species of decline

Like Alternative A, the natural disturbance processes and fire suppression would continue. Using fire would be encouraged to restore ecosystems. The tools used to restore tree species in decline would be more limited; it's likely that some would experience further decline. However, restoration could take place outside lynx habitat or in areas that do not provide winter snowshoe hare habitat. More tools would be available under Alternative D, so the extent of effect would not be as great.

On timber program

Past, present, and reasonably foreseeable actions listed in Appendix L have reduced the area available for timber harvest. Other tools, such as prescribed fire would be used to meet resource objectives in these areas. The amendment would have a limited cumulative effect on the timber program. There could be a change in the type of material harvested and where.

Plants

Affected environment

The amendment area contains populations of 216 rare plant species – see Appendix J. They include one federally listed species, one candidate for listing and 214 FS sensitive (USDA FS 1999 a & b) or BLM special status plant species (USDI BLM 2001 & 2002).

These plants occur infrequently and are generally found in specific habitats. Many are found in wet areas because they need more moisture to survive. Some are found in older stands of lodgepole pine, grand fir or subalpine fir. A few are associated with young regenerating stands, and some require periodic disturbance to maintain their populations.

- Ute ladies'-tresses *(Spiranthes diluvialis)* is a federally listed threatened species. It grows in some of the shallow, braided wetlands and seep areas in Montana and Idaho (Heidel 1997).
- Slender moonwort *(Botrychium lineare)*, a species proposed for federal listing (USDA FWS 2001), has known populations in Montana and Idaho in open areas such as roadsides or other areas dominated by low-growing plants.
- Although *whitebark pine* is not a TES (threatened, endangered or sensitive) plant, whitebark pine is in steep ecological decline due to a number of threats to the species – fire suppression, white pine blister rust and mountain pine beetles. Thinning can imitate some of the effects of the fires that historically favored whitebark pine over its competitors in mid- and high-subalpine zones after stand-replacing wildfire.

Effects

The lynx amendment would add restrictions and encourage such activities as wildland fire use at the programmatic level. It would have no direct effects.

It's difficult to determine indirect effects of programmatic direction to individual populations or habitat niches except on a very broad scale. Therefore, this analysis will evaluate potential effects at the broad scale from the restrictions imposed and activities encouraged, focusing on the direction for vegetation.

Alternative A, no action

Under the no-action alternative, the management direction in existing plans for threatened, endangered and sensitive species plants would remain in place. Current plans require site-specific analysis before projects can be implemented, so any effects on TES plants would be subject to future analysis.

Alternative B, the Proposed Action

Vegetation objectives

In all the action alternatives, Objectives VEG O1 through VEG O4 describe managing vegetation based on historical succession and disturbance processes and encouraging the development of snowshoe hare habitat, as desired future conditions.

Using historic succession and disturbance regimes, including fire, to restore ecological processes should help create a dynamic array of habitat types distributed across the landscape for TES plants.

Vegetation standards

Under Alternative B, Standards VEG S1 through VEG S6 limit the location or extent of vegetation management projects.

Generally, these limitations would not adversely affect TES plants because they constrain projects more than existing plans.

Standards VEG S5 & VEG S6

Under Alternative B, Standards VEG S5 and VEG S6 would prohibit precommercial thinning in lynx habitat, but would allow thinning to treat fuels within 200 feet of dwellings.

Prohibiting precommercial thinning would not have detrimental effects on the habitat types or ecological communities upon which any TES plants depend, and may prove beneficial to some in the long run. Allowing precommercial thinning with 200 feet of dwellings would not substantially affect any TES plants or habitat.

Young regenerating forests

In young regenerating forests, limiting thinning could help diversify habitats. Adverse effects on plants are the greatest when the thinning is heavy. Generally, light thinning has no effect, and sometimes if an underburn follows light thinning, the effect is beneficial.

Older multistory forests

In older multistory forests, plants often become established in the gaps created when overstory trees die or otherwise no longer fully occupy their growing space.

Such plants can be characterized by their ability to establish and grow in reduced sunlight.

Restoring whitebark pine
Returning historic fire regimes would be the most successful way to restore whitebark pine, but difficult to implement. Current restoration efforts rely on thinning and precommercial thinning in subalpine fir forests to mimic the effects of fire. Precommercial thinning could not be used under Alternative B, but prescribed burning could.

Therefore, Alternative B may result in a reduced ability to plan and implement whitebark pine restoration projects. Losing precommercial thinning as a tool would affect the ability to manage for the species across its range.

Grazing
Under Alternative B, Objective GRAZ O1 and Standards GRAZ S1 through S4 would limit where livestock grazing could take place.

Many of TES plants in the amendment area depend on riparian areas, so the restrictions on livestock grazing may prove beneficial to them in the long term. Proposed grazing management in *shrub-steppe* (dry places where grasslands are mixed with shrubs often including sagebrush) and wet areas would help recreate historic conditions.

Human uses
Under Alternative B, Objectives HU O1 through HU O6 and Standards HU S1 through HU S3 would limit the amount of disturbance allowed from special uses, mineral exploration and development. Any ground-disturbing activity that removes vegetation or soil, or fragments habitat, can affect TES plants – Alternative B should reduce these impacts.

Ute ladies'-tresses
Beneficial effects on Ute ladies'-tresses may result in the long term if historic succession and disturbance regimes are restored. The grazing direction would benefit this riparian-dependent species.

Slender moonwort
Beneficial effects may accrue to slender moonwort from the protections provided to young regenerating forests.

Alternative C

The effects of Alternative C are likely to be mostly beneficial to most TES plants and similar to Alternative B, particularly for grazing and human uses.

Standards VEG S5 & VEG S6
Under Alternative C, Standards VEG S5 and VEG S6 restrict all vegetation management projects, not just precommercial thinning. Research and treating fuels close to dwellings would be allowed.

Effects on TES plants would be minimal because of the minimal extent of the projects. Such projects already take place under existing plans; few TES plants are associated with the young regenerating forests where projects would take place.

Alternative C would not allow vegetation management including prescribed burning to help restore whitebark pine, and so would result in a reduced ability to do whitebark pine restoration projects.

Alternative D

The effects of Alternative D are likely to be mostly beneficial to most TES plants and similar to Alternatives B and C, particularly for grazing and human uses.

Standards VEG S5 & VEG S6
Under Alternative D, Standards VEG S5 and VEG S6 would restrict all vegetation management projects, not just precommercial thinning.

Projects would be allowed in aspen, and to release larch, ponderosa pine and white pine by daylight thinning removing no more than 20 percent of the forest cover. Research projects and treating fuels close to dwellings also would be allowed.

These projects in young regenerating forests would not substantially affect TES plants; few TES plants occur where most projects would take place.

Under Alternative D, Standard VEG S6 would also allow projects in multistoried stands that maintain or improve lynx habitat. Projects could include uneven aged management, salvage or prescribed fire. Site-specific analysis for TES plants would be conducted before any projects could take place.

Standard VEG S6 would allow thinning and burning in whitebark pine, so restoration efforts would not be inhibited.

Alternative E

The effects of Alternative E are likely to be mostly beneficial to most TES plants and most similar to Alternative C, particularly for grazing and human uses even though management direction for grazing is changed from standards to guidelines.

Standards VEG S5 & VEG S6
Under Alternative E, Standard VEG S5 would allow vegetation management projects to treat fuels and restore fire to the ecosystem.

Standard VEG S6 is dropped and replaced with a less restrictive guideline, Guideline VEG G8. Projects may occur in multistoried winter snowshoe hare habitat if reasons can be documented. The guideline encourages projects to maintain or improve forage conditions.

Alternative E is not expected to have any major effect on TES plant habitat. Site-specific analyses would be conducted for TES plants before any projects could take place.

Cumulative effects

Alternative A
The past, present and reasonably foreseeable actions listed in Appendix L have generally benefited threatened, endangered, proposed and sensitive plants by limiting disturbance.

Alternatives B, C, D & E
The lynx amendment, in addition to the past, present and reasonably foreseeable actions listed in Appendix L, would continue to benefit threatened, endangered, proposed and sensitive plants. The amendment would incorporate landscape considerations into project planning, and could further limit disturbances that could affect plants especially in riparian habitats.

Alternative C could result in the continued decline of whitebark pine in some areas because the use of prescribed fire and thinning would be precluded in winter snowshoe hare habitat. Restoration activities outside winter snowshoe hare habitat could continue.

Range

Affected environment

An active grazing allotment is a place where a term grazing permit is in effect and where livestock grazing is expected to occur most years. Depending on how the allotment is classified and the language in the term grazing permit, this may consist of either cattle or sheep, or occasionally both. In general, the season of use extends from early June to late September, although this varies depending on elevation, plant communities and management requirements.

The amendment area contains 3,751 federal grazing allotments. Of these, 1,765 or 47 percent contain habitat suitable for lynx, and 1,633 of these are active – see Table 3-41. Table K-7 in Appendix K shows a breakdown by administrative unit. The Project Record contains more data and background information.

The analysis of active grazing allotments containing lynx habitat shows that:

- 38 percent have less than a quarter of their acreage in lynx habitat
- 32 percent have more than a quarter but less than half of their acreage in lynx habitat
- 29 percent have more than half of their acreage in lynx habitat
- 15 percent lack management strategies similar to the LCAS.

Table 3-41. Grazing allotments overlapping lynx habitat

Number of allotments	3,751
Allotments with lynx habitat	1,765
Active allotments with lynx habitat	1,633
Active allotments with less than 25 percent lynx habitat	622
Active allotments with from 25 to 50 percent lynx habitat	530
Active allotments with more than 50 percent lynx habitat	481
Active allotments with lynx habitat with management strategies similar to the LCAS	1,384

Effects

Livestock grazing can affect lynx in two main ways.

- Livestock grazing has contributed to a decline in aspen (USDA FS 1998). Aspen provide snowshoe hare habitat, and are often associated with riparian areas (Ruediger et al. 2000).
- Livestock grazing may change the structure or composition of shrub-steppe habitats, changing their ability to support lynx and its prey (USDA FS 1998). Shrub-steppe habitats provide forage for lynx prey, as well as cover for lynx movement (Ruediger et al. 2000).

Under term grazing permits, livestock is managed according to the objectives, standards and guidelines in the existing plan. Objectives describe desired conditions for range management. Standards and guidelines provide sideboards for grazing, so the short-term effects are within limits that make it possible to achieve the long-term objectives.

Standards and guidelines may include restrictions about the length of the grazing season, allowable use and residual stubble height. Annual management is specified in the annual operating instructions to the permittee.

Alternative A, no action

The no-action alternative would have no effect on the livestock grazing policies of the agencies in the amendment area. Current livestock grazing practices would not change on federal grazing allotments.

Alternatives B, C, D & E

The Proposed Action includes one objective and five standards about managing livestock grazing to provide for lynx habitat needs – see Chapter 2, Table 2-1. These are Objective GRAZ O1 and Standards LINK S2, GRAZ S1, GRAZ S2, GRAZ S3 and GRAZ S4. From a grazing standpoint, there are no differences between Alternatives B, C, and D. Although these five standards are replaced by guidelines in Alternative E, the effects would be substantially the same.

About 85 percent of the active grazing allotments with lynx habitat already have management direction that provides similar protection to what's proposed in this amendment – see Appendix L. On BLM lands, the Healthy Rangeland Initiative (43 CFR 4180.1(e)(8)) provides guidance for managing healthy, productive and diverse populations of native plants. Many existing plans have been amended to include such direction as INFISH which applies to FS units west of the Continental Divide, and PACFISH, which applies to FS and BLM units with anadromous fish.

Such direction includes requirements for maintaining and limiting livestock use in

riparian areas. It generally provides enough direction to manage grazing so it does not adversely impact lynx habitat – little change would be needed to meet the standards proposed in this amendment.

For the 15 percent of active allotments in lynx habitat whose existing plans do not contain similar management direction – all east of the Continental Divide – the Proposed Action and its alternatives would add direction to make sure livestock grazing management would maintain or enhance lynx habitat.

In turn, the Proposed Action and its alternatives would have only minimal effect on livestock grazing operations. In specific instances where a potential exists for negative interactions with livestock, this could result in a need to intensify livestock management. In most cases, this would likely consist of changing the timing, intensity, duration or frequency of livestock use in a specific area. In a very few cases, structural improvements like fences could be required to make sure livestock could be managed appropriately.

Cumulative effects

Alternative A
The past, present and reasonably foreseeable actions listed in Appendix L have cumulatively limited or restricted where or how livestock grazing can occur, especially west of the Continental Divide.

Alternatives B, C, D & E
The lynx amendment, in addition to the past, present and reasonably foreseeable actions listed in Appendix L, would further limit or restrict where grazing can occur, extending the restrictions to east of the Continental Divide.

In areas west of the Continental Divide there would be limited cumulative effects because most of the management direction proposed is already included in existing plans. East of the Continental Divide, some change in livestock management may be necessary, but the amendment does not preclude livestock management.